Alignment as a Process of Enabling Organizational Adaptation: Extending the Theory of Alignment as Guided Adaptation

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Submitted to the Faculty of the University Graduate School
in Partial Fulfillment of the Requirements
for the Degree
Doctor of Philosophy
in the Kelley School of Business
Indiana University

December, 2005

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For My Father – W. Bayne Ward

ACKNOWLEDGEMENTS

Anyone who completes a dissertation eventually must realize they did not do it alone. It requires guidance, support, and encouragement from those closest to you during the process. For me, that is my wife, Julie, and, my advisor, Dr. Iris Vessey.

I still remember the look on Julie's face when, after we finally settled in after completing my MBA, I sprung the news on her that I wanted to get my PhD. She knew right away all the implications and difficulties, but as always, she was supportive. Thank you.

As for Iris Vessey, it is impossible to truly express my gratitude for all her help and support. I knew when I first started working with her that she was the right person to be my advisor. Iris is an individual of high standards and great integrity. She is selfless with her time and always willing to provide guidance. No matter how difficult things got, I always knew that with Iris as my advisor, I was headed in the right direction. Because of the selflessness and giving of someone like Iris, it is impossible to repay them. As close as I can come to repaying her is to be an academician that she will be proud of. It is my hope that she will be as proud to call me her student, as I am to call her my advisor. Iris, thank you so very much. I appreciate everything you have done for me.

There are three additional groups of people that I owe a particular debt of gratitude to: my family, the faculty and staff at Indiana University, and my fellow PhD students. First, I am very fortunate to have my family. My mom has always encouraged and supported me. I appreciate having a mother that loves and supports me. Thanks mom. I am also very fortunate to have a brother (Gary) and sister (Becky) who have been important in my life. I would also like to mention my niece (Kristy) and nephew (Blake). It is my

hope that they understand their future is unlimited if they follow their true passions and work at succeeding.

Second, the faculty and staff at IU have been wonderful. They have been supportive, and over the course of the last few years, many have gone beyond their rolls to become my friends. From Sue Brown, Catherine Dalton, and Alan Dennis, my committee members, to Barb, Brenda, Kelly, and Gina, the support personnel, I couldn't have done this with out you.

Third, I want to thank my fellow PhD students. I already miss our great debates and animated discussions. How can one develop into a scholar with out very bright individuals who engage in rigorous intellectual discourse? Truly, you have helped me develop my rhetorical skills. It will be very difficult to duplicate the fun I had, particularly during our many lunches at Wright Hall.

I want to add a final note to Major Kenn Knarr, USMC, one of my oldest and dearest friends. Kenny has encouraged and inspired me from our days in high school. There is an old saying that success is not how far you go in life, but what you overcome to get there. If people only knew how far we have come, they would understand the pride I share in our accomplishments.

Abstract

This dissertation seeks to generalize and extend the theory of alignment as guided adaptation (TAGA) (Ward & Vessey Working Paper). TAGA is a descriptive theory that views alignment from a multilevel, process-oriented prospective. It is based upon the premise that in the short run each alignment factor adapts independently of the others in the alignment system. In the long run, however, the alignment factors are an interdependent system. TAGA was developed based on a small firm that had a non-strategic view of IS. This dissertation therefore seeks to generalize the theory to firms that have a formal IS strategy and planning process and are large in size. The dissertation also extends the theory by examining the role that changes external to the alignment factors play in the alignment factor adaptation process.

Three case studies were conducted using semi-structured interviews with 31 high-level business and IS managers as data sources. The data was coded into change episodes demarcated by changes in business strategy (intent and initiatives) and was analyzed using alternative templates, visual mapping, and temporal bracketing strategies (Langley 1999; Ward & Vessey Working Paper).

The results indicate that TAGA generalizes to large firms and to firms with a formal IS strategy and planning process. Within these additional contexts, TAGA was able to explain the patterns of change in the alignment episodes while the traditional view of alignment as synchronization could not. The results also indicate that changes in the outer environment such as the level at which the changed occurred in the factor

hierarchy, the magnitude of the change initiating adaptation, and the pace at which change occurred influenced the need for change in the internal alignment factors.

This research has implications for both academic and practitioner communities. The research shows that TAGA is applicable to firms that have a formal IS strategy and planning process; and that factors such as the level, magnitude, and pace of changes impacts the adaptation process. From a practitioner perspective, this research provides insight into managing the alignment process by redefining how to view alignment.

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1 Chapter 1 – Introduction and Overview

1.1 Introduction

IS alignment is an issue of great importance to the field of management information systems. Recently, IT and business alignment was ranked as the number one concern facing CIOs (Luftman & McLean 2004; Luftman 2005) and alignment has consistently ranked as one of the top concerns for the last 15 years (Brancheau, Janz & Wetherbe 1996; Watson & Brancheau 1991; Watson, Kelly, Galliers, & Brancheau 1997). IS alignment is of such importance among the practitioner community that IS alignment has been referred to as the "Holy Grail of IT" (Jahnke 2003).

Despite its perceived importance, IS alignment remains an enigma for both academic researchers and IS professionals. Computerworld reported that 49% of CFOs perceived IT and business strategy alignment as being either weak or non-existent (Hoffman 2003). This view is supported by academic research that continues to identify only limited alignment in practice (Chan 2002). Further, prior alignment research has failed to capture the dynamic nature of alignment (see, for example, Chan 2002; Chan et al. 1997; Sabherwal & Chan 2001; Sabherwal et al. 2001 among others).

Traditionally, IS alignment has been addressed as alignment among business and IS strategies and structures, which are commonly referred to as the "alignment factors." The majority of alignment research has drawn upon the work of Henderson and Venkatraman (1993) and defines alignment as fit (Venkatraman 1989) or synchronization (Sabherwal et al. 2001; Smaczny 2001) among the alignment factors in the model. It is widely held

that appropriate alignment is related to increased organizational performance (Chan 2002; Chan, Huff, Barclay, and Copeland 1997; Henderson and Venkatraman 1993; Sabherwal and Chan 2001; Sabherwal, Hirschheim, and Goles 2001). The traditional research approaches have, however, had limited success in linking IS alignment to firm performance (Chan 2002) and have fallen short in their ability to explain, theoretically, conditions actually observed in practice, such as a lack of formal IS strategy (Sabherwal, Hirschheim, & Goles 2001; Ward & Vessey Working Paper) and the lack of structural alignment (Chan 2002).

The recent trend in IS alignment research has been to move away from the traditional synchronization approach and to examine IS alignment as a dynamic process (Sabherwal, Hirschheim and Goles 2002; Sauer & Yetton 1994; Smazcny 2001; Ward & Vessey Working Paper). This approach has led to the development of the theory of alignment as guided adaptation (Ward & Vessey Working Paper).

In the context of midsized businesses with little formal IS strategy, the theory of alignment as guided adaptation (TAGA) is more explanatory than traditional alignment theory. First, TAGA views alignment as a process, explaining the lack of alignment based on a synchronization perspective. Second, TAGA explains how firms can survive and thrive without a formal IS strategy, a frequent observation from practice that is counter to the traditional link between alignment and performance. Third, TGA is descriptive, explaining how alignment actually occurs over time.

The theory of alignment as guided adaptation views alignment as the ability of the alignment factors to allow the organization to adapt to a changing environment while moving towards organizational goals. Alignment is viewed as a process of continuous

adaptation among the four commonly-accepted "alignment factors," which form part of a larger alignment process that encompasses strategic goals and the external environment. The alignment factors are viewed as being decoupled in the short run, that is, adapting autonomously, in an as needed manner, to changed circumstances in the company and its environment. The alignment factors change only when they are no longer able to function appropriately given the altered environment in which they operate.

Based on TAGA, the primary role of information systems is as an enabler of organizational goals. As long as the information systems remain adapted to the environment, the IS allows the organization to continue moving towards the organizational goals and the IS is aligned with the organization. TAGA views a company that successfully maintains IS alignment as one that is able to anticipate how IS might enable or constrain the organization's goals.

The development of TAGA motivates additional research that can move us closer towards solving the enigma of IS alignment. Because TAGA views the role of IS as enabling organizational goals, it is important to determine enabling characteristics of an organization's information systems. Based on this perspective, the overall research question addressed is:

How does IS enable organizations to adapt to change?

1.2 Research Overview

The research in this dissertation is addressed in two phases, each phase designed to progressively move the research towards answering the overall research question. The first phase builds upon the existing theoretical foundation of TAGA by examining the generalizability of the theory. The second phase delves deeper into the adaptation

process of the alignment factors by exploring the impact of environmental change on the IS alignment factors.

The first step (Phase I) in addressing the overall research question is the examination of initial boundary conditions of TAGA. A theoretical contribution requires development of "temporal and contextual factors" that bound the theory, a step that is particularly important to inductively generated theory (Whetten 1989). The boundaries set the limitations in applying theory and are necessary before proper use and testing of the theory is conducted (Bacharach 1989). While the development of TAGA employed an iterative process of both induction and deduction, the focus was on inductive development of the theory (Ward & Vessey Working Paper) and therefore the boundaries of the theory need to be assessed.

Despite the additional explanatory power exhibited by TAGA over the traditional view of alignment, it is possible that TAGA is bound by the context in which it was initially developed. Specifically, the initial development of TAGA addressed a midsized organization in which there was no formal IS strategy, and did not address whether alignment as synchronization may hold in larger firms that have a formal approach to IS strategy. This research determines whether TAGA is more explanatory than alignment viewed as synchronization in larger firms and in firms with a more formalized IS strategy. Phase I thus addresses how the organization's contextual setting impacts the pattern of change in the internal alignment factors. Specifically, Phase I examines the impact of firm size and formalization of IS strategy on the pattern of changes in the alignment factors.

The second step in addressing the overall research question is to understand how environmental change impacts the adaptation process. Once the boundaries of a theory are established, it is important to develop the "what", "how", and "why" of the theory (Whetten 1989). The "why," or theoretical foundation, was established in the initial development of TAGA (Ward & Vessey Working Paper). Thus after examining boundary conditions, the next step is to develop a deeper theoretical understanding of the adaptation process or, to determine the "what" of the theory.

The theory of alignment as guided adaptation indicates that changes in an alignment factor are motivated by changes in the factor's environment. However, little is known about what characteristics of change in the environment motivate the adaptation process of individual alignment factors. Phase II addresses this issue by proposing that change in the outer environment has multiple dimensions that impact the need for adaptation of the alignment factors.

A multiple case study examining three case sites was conducted. Semi-structured interviews with high-level managers and documentary sources were used as data sources. The data covered a ten-year period and was coded into alignment episodes delimited by changes in strategic goals (strategic intent) or changes in strategic initiatives. Alignment episodes include change events for all alignment factors that occurred during the time period. The data was analyzed by using alternative templates, visual mapping, and temporal bracketing strategies (Langley 1999; Ward & Vessey Working Paper).

In summary, this research has two specific objectives: 1) to examine the generalizability and theoretical boundaries of TAGA, and 2) to understand what

characteristics of change in the outer environment triggers adaptation in the alignment factors.

1.3 Contribution of Research

This research has implications for both the academic and practitioner communities. From a research perspective, the research assesses the generalizability of TAGA to additional business settings; specifically to larger firms and to firms with a more formal IS strategy and planning process. Given TAGA's superior explanatory power over the theory of alignment viewed as synchronization, TAGA was established as the preferred theory, over alignment as synchronization within these boundary conditions.

By decoupling IS structure and processes from the other alignment factors in the short run, TAGA provides an explanation for how an organization can be successful despite the lack of perceived alignment or management's strategic focus on IS. Further, explaining the impact of change on the adaptation process and developing theory related to the role of IS in the adaptation process provides the theoretical foundation to answer fundamental questions about the role of IS in modern business organizations.

From a practitioner perspective, this research provides new insight into solving the enigma of IS alignment. TAGA's generalizability to additional settings shows that the difficulty organizations have in aligning their IS with the business is partially the result of a lack of understanding regarding what alignment is and how it occurs. Understanding how environmental change drives the adaptation process of the internal alignment factors provides the first step in being able to manage the alignment process and leads to an understanding of how IS enables an organization to change.

1.4 Overview of Dissertation

The remaining chapters of this dissertation follow the outline of a traditional dissertation, as described below:

Chapter 2 – Chapter 2 provides the theoretical background for the research by reviewing the relevant alignment literature and by presenting the theory of alignment as guided adaptation. Chapter 2 is divided into two major subsections. The first subsection presents relevant literature, focusing on the alignment model of Henderson & Venkatraman (1993). An analysis of prior research is presented together with a discussion of the limitations that set the stage for the initial development of TAGA. The second subsection presents a detailed introduction to the theory of alignment as guided adaptation. This subsection includes a discussion of the theoretical foundations of TAGA and applies these theoretical foundations to develop the theory that explains the alignment process, at least in midsized organizations without a formal IS strategy.

Chapter 3 – Chapter 3 presents the theoretical notions behind the conceptualization of the research. In addressing the generalizability of TAGA, hypotheses establish rival patterns of events based on TAGA and alignment as synchronization. In Phase II propositions are developed that examine the characteristics of external change on the alignment factors. The propositions seek to explain the relationship between the dimensions of environmental change and the change events of the alignment factors.

Chapter 4 – Chapter 4 presents the research methodology. Case study research is discussed along with its appropriateness in this specific research context. This section describes methodological details such as case site selection criteria, nature and reason for the evidence collected, and methods of data analysis. Finally, this section addresses how

case studies should be judged from the viewpoint of methodological rigor, and how rigor is addressed in this research.

Chapter 5 - Chapter 5 presents the results of the research. This section begins by presenting the three cases. Then results for testing Phase I hypotheses are presented, followed by the results for the Phase II propositions. Both phases integrate charts and tables into the results as vehicles for organizing and presenting the data.

Chapter 6 – Chapter 6 presents a discussion of the results. The discussion of Phase I and II are presented separately. A third section presents a discussion of issues unique to individual case sites and of issues that apply to all of the propositions. Finally, the limitations and the implications of the research are addressed.

Chapter 7 – Chapter 7 concludes the dissertation with a summary of the research and directions for future research.

2 Chapter 2 – Literature Review

This chapter presents prior literature on IS alignment and introduces the theory of alignment as guided adaptation. The first section focuses on the most influential model of IS alignment to date, that of Henderson and Venkatraman (1993) and the stream of research that ensued, followed by an analysis of issues raised in the IS alignment literature. The second section presents the most recent theoretical formulation of IS alignment, the theory of alignment as guided adaptation.

2.1 Prior Research on IS Alignment

While the roots of strategic alignment can be traced back to the classic management writings of Chandler (1962), the most prominent work integrating information technology into strategic alignment has been the "strategic alignment model" of Henderson and Venkatraman. Since its initial publication in 1991, the strategic alignment model has served as the foundation for the majority of IS alignment literature. For this reason, this model and certain of the significant number of studies that have addressed it are presented as foundational literature for this research.

2.1.1 Henderson and Venkatraman's Strategic Alignment Model

In response to the growing strategic role of information systems in modern organizations, Henderson and Venkatraman (1993) developed a framework to conceptualize the strategic use of information technology (see Figure 2-1). Henderson and Venkatraman present their work on alignment in multiple versions (see for example, Henderson & Venkatraman 1992, 1993, 1994, 1996). These variations provide the same

basic model with only minor modification to the theoretical content. The discussion presented here focuses on the 1993 publication. When aspects of the model are presented that derive primarily from a different version of the model, that publication is cited.

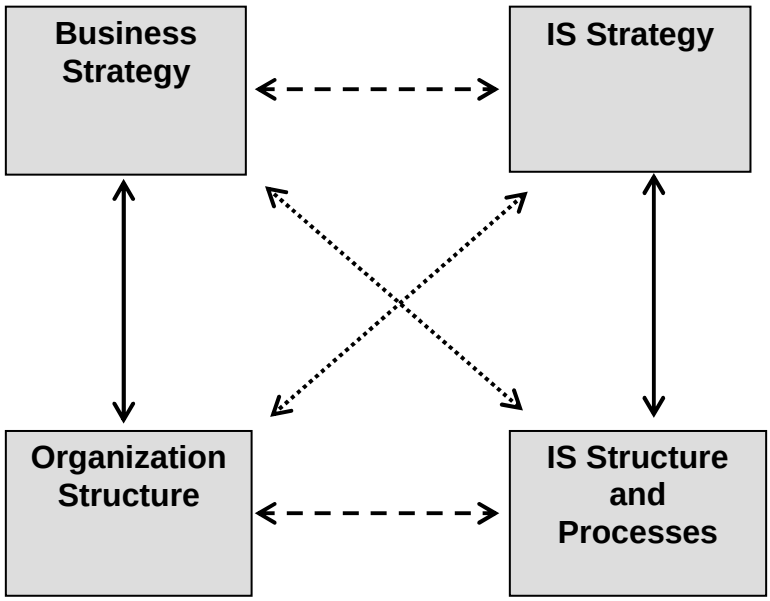

Figure 2-1: Foundational Model of IS Alignment
(Henderson and Venkatraman 1993)

The strategic alignment model of Henderson and Venkatraman (1993) explains IT alignment in terms of two components of strategic management: 1) strategic fit and 2) functional integration. The first component, strategic fit, represents the appropriateness of the internal domain to the external domain, or in other words, how well the internal structures of the firm fit with the firm's strategic positioning. The second component, functional integration, represents the fit of the business and IT internal functional domains.

Henderson and Venkatraman identified four internal functional domains or "alignment factors": 1) business strategy, 2) information technology strategy, 3) organizational infrastructure and processes, and 4) information technology infrastructure and processes. First, "business strategy" represents both the formulation of firm and

product positioning and the implementation of firm resources to reach the firm's chosen positioning. Second, "IT strategy" is defined in a similar way to business strategy, except that it addresses the information technology domain, rather than the business domain. The third alignment factor is "organizational infrastructure and processes." This factor represents the "choices that determine the internal arrangements of the firm that are necessary to execute the business strategy." (Henderson & Venkatraman 1991, pg. 74) The term "infrastructure" is defined by Henderson and Venkatraman (1993) to include "structure, roles, and reporting relationships," while "processes" are defined to include work flows related to key activities. Note that the definition of infrastructure and processes also includes the skills of the individuals required to execute the business strategy (Henderson & Venkatraman 1993). Fourth, "IT infrastructure and processes" shares a similar definition to the organizational infrastructure and processes, but is bounded by the domain of information technology.

The primary focus of Henderson and Venkatraman's strategic alignment model is the relationships among the four alignment factors. Henderson and Venkatraman (1994) refer to fit between any two of the four factors as bi-variate fit, a situation that they regard as "myopic and dysfunctional." Alignment among three of the alignment factors is referred to as multivariate, or cross-domain, alignment. Alignment of three factors is more effective than bi-variate alignment, but still incomplete. The ultimate fit according to Henderson and Venkatraman (1994) is strategic alignment, which requires "simultaneous or concurrent attention to all four domains."

2.1.2 Assessment of the Strategic Alignment Model

This section assesses Henderson and Venkatraman's strategic alignment model by discussing the foremost implications of the model and the research stream it has spawned. The implications address issues with the traditional alignment model and how subsequent research has interpreted the model.

First, derived directly from the concept of strategic fit (Henderson & Venkatraman 1993, pg. 472) is the assumption that alignment is linked to firm performance. The assumption of strategic fit is that the firm's performance increases when the internal domain is aligned to the external domain; implying that the better the alignment, the better the performance. While there is some support for the notion that alignment defined in this way is related to improved performance (see, for example, Chan et al. 1997), the findings have not been convincing (see, for example, Palmer & Markus 2000).

The inability to link alignment conclusively to performance results in two possible conclusions: 1) the underlying assumption is not valid; or 2) the equivocal findings are the result of the operationalization of the studies to date. Given the established difficulties of research that has attempted to link information technology to performance (see for example, Hitt & Brynjolfsson 1993), there is reason to suspect the later. There is also recent research to suggest that, depending on the economics of the industry, alignment as defined by the strategic alignment model for information systems may not be a necessary and sufficient condition for firms to outperform their peers (Ward & Vessey Working Paper).

A second implication deriving from the concept of strategic fit is that alignment is a "process of continuous adaptation and change" (Henderson & Venkatraman 1993, pg. 473). And, indeed, a common theme that runs through published studies is that

alignment is a dynamic process (Chan 2002; Chan et al. 1997; Henderson and Venkatraman 1993; Sabherwal & Chan 2001). For example, Chan (2002) concludes that to use IS appropriately requires flexibility and fluidity and refers to IS alignment as a journey that is a dynamic, emergent process. However, with the exception of the studies by Sauer and Yetton (1994), Sabherwal et al. (2001), and more recently, Peppard and Breu (2003), and Ward and Vessey (Working Paper), all alignment studies, of which we are aware, have used a cross-sectional approach to operationalize the strategic alignment model; that is, they have taken snapshots of a number of the factors at a point in time, hence viewing alignment as static (see Chan et al. 1997; Jarvenpaa & Ives 1993; Sabherwal & Chan 2001, for example).

Third, although the concept of strategic fit includes the relationship between the firm and its "competitive product-market arena" (Henderson & Venkatraman 1993, pg. 473), Henderson and Venkatraman do not directly address or develop the relationship between the firm and the external environment. Further, the strategic alignment model does not accommodate an external stimulus for change. There are no "outside" influences in the strategic alignment model that would cause the system to go out of alignment; for example, there is no discussion of how changes in a broader environment might occasion changes in the alignment factors in order to restore alignment.

The cross-sectional approach to research on the strategic alignment model, combined with the lack of a developed relationship between the firm and the environment, has led to IS alignment being viewed as "synchronization" in which a change in one alignment factor is viewed as leading to changes in each of the other factors (Sabherwal, et al. 2001; Smaczny 2001). The strategic alignment model interpreted as synchronization represents

a state of equilibrium among the alignment factors; an equilibrium that is self-perpetuating. Changes in the alignment factors are viewed as occurring effectively simultaneously, and effective performance is viewed as resulting when all four factors are in alignment. In other words, if one factor changes, all factors should change, otherwise the system will no longer be in alignment.

Fourth, much of the research that has been conducted has focused on assessing the relationship between just two of the alignment factors, a bi-variate approach. Chan et al. (1997), for example, examined the relationship between business and IS strategy and the effect of the factors separately and together on business performance and IS effectiveness. (See, also, studies by Jarvenpaa & Ives 1993; Fiedler, Grover, & Teng 1996.) However, such studies do not treat the four alignment factors as a system in which the factors work together to form a larger whole. Recall that the model of strategic alignment views alignment as arising from multiple interactions among all four alignment factors (Henderson & Venkatraman 1994) and that strategic alignment "means simultaneous or concurrent attention to all four domains." Thus research that focuses on bi-variate relationships does not represent a complete test of the strategic alignment model.

2.1.3 Evaluation of Literature Based on the Strategic Alignment Model

Despite the substantial body of research on IS alignment, there are issues that remain unresolved. It has not been established conclusively that alignment is linked to performance, a foundational assumption of the strategic alignment model. Nor has the dynamic nature of alignment and its implications been adequately explored. While the findings of alignment studies based upon Henderson and Venkatraman's model have

generally supported certain aspects of the model, those studies have largely failed to conduct adequate tests of the model.

Researchers have started to address some of these issues. Sauer and Yetton (1994), for example, conclude that IS alignment should be viewed as a dynamic process that recognizes that IS alignment can occur by different paths. Sabherwal et al. (2001) likewise acknowledge the dynamic nature of alignment by applying punctuated equilibrium theory to the alignment process. Recently Peppard and Breu (2003) proposed studying IS alignment using coevolution as a theory base to examine the process of alignment.

The most recent research to address these issues is the theory of alignment as guided adaptation (TAGA) (Ward & Vessey Working Paper). The theory of alignment as guided adaptation is a process oriented; multilevel theory that addresses IS alignment as a dynamic process. In the next section, the theory of alignment as guided adaptation is presented in detail.

2.2 Theory of Alignment as Guided Adaptation

This section introduces the theory of alignment as guided adaptation (Ward & Vessey Working Paper). First, the theoretical foundation for TAGA is presented to provide a conceptual understanding for the theory. Second, the alignment factors as utilized by TAGA and their comparison to the strategic alignment model‘s alignment factors are discussed. Third, the adaptation process of alignment as guided adaptation is conceptualized based on the interrelationships between the firm and its environment. This section concludes with a discussion of how internal alignment factors adapt autonomously within the firm.

2.2.1 Theoretical Foundation

The theoretical foundation of TAGA lies in the concepts associated with the evolutionary and ecological theories of strategy process (see, for example, Barnett & Burgelman 1996; Burgelman 1991 1994; Hannan & Freeman 1982; Nelson & Winter 1977; Noda & Bower 1996). In particular, TAGA draws upon a recent formulation of strategy process presented by Lovas and Ghoshal (2000) that characterizes the evolutionary process as one of guided evolution. In guided evolution, the organization is viewed as "an ecological system purposefully designed to guide the evolution of strategy." In contrast to prior evolutionary models, the Lovas and Ghoshal model incorporates a role for top management. Strategy is viewed as having both strategic intent (goals) and strategic initiatives (means). Management can influence the evolutionary course of the firm by establishing the strategic intent and implementing strategic initiatives to guide the organization toward its strategic intent.

Note that this evolutionary view of strategy applies to both natural and artificial selection environments (Levinthal 1994), and, indeed, its application in strategy process research is an example of applying it to an artificial environment. Building on this view, TAGA views an organization as an artificial (man-made) system. Viewing an organization as an artificial system allows the use of Simon's (1996) concepts of a sciences of the artificial as the theoretical foundation to understand artificial systems and how they adapt in changing environments.

Simon characterizes an artificial system, or using Simon's terminology an "artifact," in terms of its purpose, its internal structure, and the environment in which the artifact exists. An artifact will serve its intended purpose when it is appropriate to the conditions in the environment, and vice versa. When the artifact is well adapted to its environment,

it will fulfill its intended purpose. Hence, the way in which an artifact behaves can often be predicted from knowledge of its purpose and its environment. When viewing an artifact from this perspective, it is not necessary to know how the system is structured internally for it to function effectively. Under conditions of adaptation, therefore, the functioning of the system can be understood in terms of the environmental conditions and the interface between the artifact and its external environment. Further, according to Simon (1996, pg. 11), only a few of the characteristics of the environment will drive the adaptation of the artifact to its intended purpose:

> "In very many cases, whether a particular artifact achieves a particular goal or adaptation depends only on a few characteristics of the outer environment and not at all on the details of the environment."

Therefore, the key is to organize and structure an artificial system in such a way that it is insulated (or buffered) from its environment, and in particular, the few elements of the environment that impact it the most. Within limits, an artificial system properly designed for its environment, can remain adapted to its environment and maintain an invariant relationship to its environment without altering its internal structure.

Simon (1996) refers to artificial systems that have "a large number of parts that have many interactions," as complex systems. Complex systems are hierarchical in nature and can be decomposed into subsystems. The complexity results from interactions that occur among the subsystems and among multiple levels of the hierarchical structure. It is therefore necessary, in order to understand a complex system, to differentiate between interactions among systems and their environment and interactions within the hierarchical structures of the subsystems that comprise a complex system. Simon proposed that:

> "(1) in a nearly decomposable system the short-run behavior of each of the component subsystems is approximately independent of the short-run behavior of

> the other components; (2) in the long run the behavior of any one of the components depends in only an aggregate way on the behavior of the other components (pg. 198)."

The complexity limits the ability to predict future outcomes, which in turn, limits the ability to make rational choices for the allocation of limited resources (Simon 1996, pg. 35). The greater the uncertainty in the environment or the less able a system is to predict or forecast its future, the more important it is for the system to be able to adapt to change in its environment (Simon 1996). Adaptation allows a system to correct for incomplete information about the environment by allowing the system, via feedback and adjustment, to correct its path and continue towards its goals as environmental change occurs.

A complex artificial system can be viewed as being decomposed into subsystems that in the short-run act independently of the other subsystems. Applying Simon's logic of an artifact and his notion of complex systems to an artificial system composed of the four internal alignment factors leads us to alignment as guided adaptation.

Drawing on both Simon (1996) and Lovas and Ghoshal (2000), the theory of alignment as guided adaptation views alignment from a multilevel, process-oriented perspective. The organization is viewed as a hierarchical, complex system that is comprised of subsystems (the alignment factors) (see Figure 2-2).

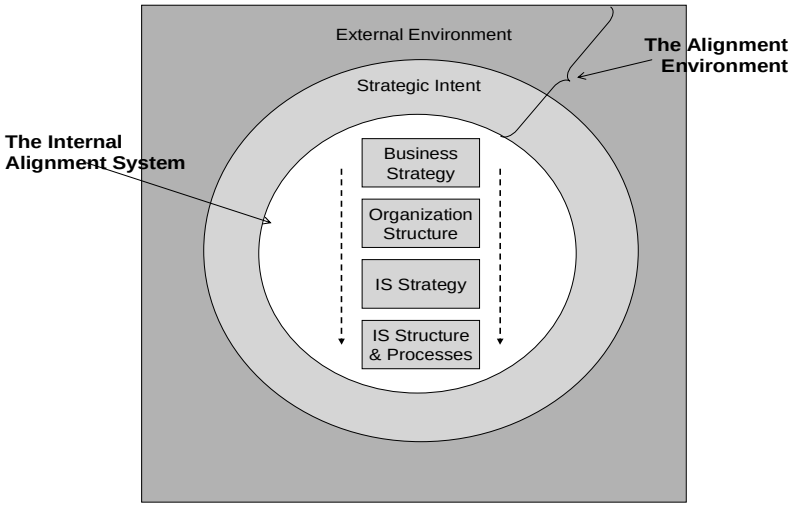

Figure 2-2: Conceptual Model of Alignment in Alignment as Guided Adaptation

Just as the organizational system adapts to its external environment, so do the individual factors, or subsystems, adapt to their own environment. TAGA views an organization as a goal-seeking entity that evolves in a continuously changing environment. Management can guide this evolutionary process through the strategy selected and implemented, which is operationalized in TAGA via strategic intent and strategic initiatives.

2.2.2 The Alignment Factors of TAGA

TAGA incorporates two additional factors external to the firm (the external environment and strategic intent), known as the alignment environment, in addition to the four internal functional alignment factors of Henderson and Venkatraman. TAGA refers to the latter as the internal alignment system. Alignment is viewed as a process of continuous adaptation among the six alignment factors. Because the factors in the internal alignment system are similar to the factors defined by Henderson and

Venkatraman (1993), only the differences between Henderson and Venkatraman's conceptualization and that of TAGA are discussed.

The definition of strategy used in TAGA differs from that of Henderson and Venkatraman (1993). In TAGA, the definition of strategy is consistent with the theoretical perspectives of Lovas and Ghoshal (2000). The business strategy internal to the organization is viewed as being addressed by strategic initiatives (Lovas & Ghoshal 2000), or the strategic business means utilized to reach the corporate goals. IS[1] strategy likewise differs from the definition of Henderson and Venkatraman. IS strategy in TAGA follows the definition of Lovas and Ghoshal by referring to the strategic initiatives implemented by management to utilize IS.

Henderson and Venkatraman (1993) used the terms "organizational and IT infrastructure and processes" in their model to refer to the operational domains of the organization and information technology. TAGA simply uses the terms "organizational structure" and "IS structure" as abbreviated terms to represent Henderson and Venkatraman's definition of infrastructure and processes.

As we have seen, TAGA also includes roles for the two additional alignment factors in the alignment environment: the external environment and the organization's strategic intent. The external environment represents the external, and largely uncontrollable, forces with which the organization and its subsystems must interact to move towards organizational goals (e.g., market conditions, competitors, government regulations, etc.). Strategic intent is the interface between the external environment and the internal

[1] The term "information systems" (or IS) as opposed to "information technology" (or IT) will be used in the theory of guided adaptation. While the two terms have occasionally been viewed as interchangeable, IS in this research is intended to include a broader definition that includes technology, systems, processes, and human resources, as opposed to a more restrictive definition of information technology that in this research refers to technology and systems, alone.

alignment factors. The strategic intent is the "preferred future position of the firm as articulated by its top management" (Lovas & Ghoshal 2000) and as such, provides direction to the interaction of the organization and its external environment. In other words, the strategic intent represents the organizational goals set by management. Alignment among the four internal alignment factors occurs in response to changes in the external environment in light of the company's strategic intent.

The alignment factors are related hierarchically (see Figure 2.2). The external environment is at the highest level of the hierarchy creating direct forces on the evolutionary path of the organization and impacting the success of the organization's adaptive processes in moving the organization towards its strategic intent. Management determines the strategic intent and then guides the firm towards its goals via the strategic initiatives it selects. The organizational structure supports the business strategy (Chandler 1962; Amburgey & Dacin 1994). Because IS strategy and structure represent the domain of IS, they are considered as supporting the chosen business strategy and the organizational structure. IS strategy and structure therefore parallel the overall organizational hierarchy of strategy and structure, but are bound by the domain of IS.

TAGA does not view the hierarchical relationship in a strict sense where all change flows down from the top in a synchronized fashion. The implication of the hierarchical relationship is that factors higher in the hierarchy are more likely to trigger changes in lower level alignment factors than vice versa. For example, TAGA views a change in strategic initiatives, such as acquiring a competitor, as being more likely to trigger the need for change in IS structure than a change from a mainframe to client server environment is likely to trigger a change in strategic initiatives. TAGA does recognize,

however, that change in a lower level may trigger changes in a higher level such as altering the organizational structure to take advantage of implementing an ERP.

2.2.3 Adaptation of the Alignment System

TAGA views the alignment system as an artificial system in homeostasis with its external environment. That homeostasis may be challenged when the external environment upon which the internal system depends changes. When a change in the environment can no longer be accommodated by the firm's current strategies and structures, the firm can no longer progress towards its goals, and the firm must alter its internal structure (i.e., at least one of the alignment factors must change). With substantial change in the external environment, the alignment system may need to alter its internal structure. Change in the alignment system is triggered, therefore, when there is a change in the alignment system's external environment or strategic intent. Hence, TAGA views the alignment environment as the driver of change.

An underlying assumption of the theory of alignment as guided adaptation is that a system does not alter its internal structure without an external driver. All change to strategic intent or the alignment system is initiated by management and is triggered by external change, or triggered by management's anticipation of external change.

Changes in the alignment environment, however, will not always lead to change in the organization and thus the alignment system. As long as the changes in the alignment environment are not sufficiently substantial, that is, they have relatively little impact on the organization, the alignment factors may be sufficiently flexible to adjust to the altered environment, in which case the organization may remain adapted to its alignment environment and continue to move towards its goals without requiring change in the

internal structure of the alignment system. Therefore change, or anticipated change, in the alignment environment is a necessary, but not sufficient, condition for change to the alignment system.

2.2.4 Adaptation Among Individual Alignment Factors

TAGA considers each of the internal alignment factors as a system in its own right (Simon 1996; Holland 1995), and as a "subsystem" of the alignment system. Each of the alignment factors has an intended purpose and interacts with, and adapts to, changes in its outer environment.[2] The outer environment of any particular alignment factor includes the other factors; and a change in a single factor represents a change to the outer environment for each of the other individual alignment factors. At some point, the changes in the outer environment of a single internal alignment factor may be so great that it will no longer be adapted to its outer environment and therefore the individual alignment factor itself will need to be modified so that it again assumes a state of equilibrium within its current outer environment.

Whether any other individual alignment factors change or not in response to a change in an individual alignment factor is determined by the extent to which the other factors are able to support, or adapt to, changes in their outer environment. If the other alignment factors can adapt to their altered outer environments, the internal structure of those factors will not need to change. If, on the other hand, an alignment factor cannot meet the needs of its altered environment, that factor will need to alter its internal structure and the change will result in a change in the environment of the other alignment

[2] The use of the term "outer environment" as opposed to the term "external environment" is intentional. The theory of guided adaptation is a multilevel theory and the use of the term external environment specifically refers to the environment external to the alignment system. The term outer environment is thus used to describe the outer environment of any single alignment factor as a system in its own right.

factors. Again, those individual alignment factors that are not able to adapt to these changes in their environments may also need to change their internal structures in response. This process of multiple systems adapting to each other is a process referred to as coevolution (Axelrod and Cohen 2000).

Coevolution of alignment factors is the reason the hierarchical relationship is not a strict, top down relationship. A lower level change such as to IS structure still represents a change to the outer environment of the alignment factors above it in the hierarchy and thus a change to a lower level alignment factor can necessitate a change to the internal structure of the higher order alignment factor.

TAGA then, is a process of alignment as guided adaptation in which change in an alignment factor depends on its ability to adapt to changes in its outer environment. From this viewpoint, although the internal alignment factors are interdependent and co-evolving, none is directly determined by any of the other internal alignment factors. Note, therefore, that the notion of alignment as guided adaptation is essentially based on the short term independence or "decoupling" of the individual factors, a corollary that derives directly from Simon's notions of a science of the artificial. The alignment factors are viewed, therefore, as being decoupled, that is, adapting autonomously, in an "as needed" manner, to changed circumstances in the company and its environment. Because an organization, and thus the alignment system, is an artificial system created by man, managers of the organization can manipulate the system to guide the way in which the alignment system adapts to its environment.

3 Chapter 3 – Research Model

In this section, a two phased research program for testing and further theory development is presented. Phase I proposes assessing the theory of alignment as guided adaptation in different organizational settings to establish initial theoretical boundaries. Phase II deepens the theory. Specifically, Phase II develops dimensions of change, which are predicted by TAGA to drive change in the alignment factors.

3.1 Phase I – Testing the Theory of Alignment as Guided Adaptation

Phase I focuses on testing the theory of alignment as guided adaptation. The theoretical basis for testing TAGA is presented and used to develop testable propositions and hypotheses.

3.1.1 Assessing the Theory in Different Organizational Settings

Testing the theory of alignment as guided adaptation in multiple organizational settings is the next step in the development of TAGA. The theory of alignment as guided adaptation was developed in the context of a midsized firm that viewed information systems as a necessary support function, the cost of which was to be minimized. This management perspective on IS leaves the theory of alignment as guided adaptation open to the possibility that TAGA might not be applicable in a different organizational setting.

The need for testing as the next step in the research program can be viewed as an issue of generalizability. Generalizing to theory, or what Yin (1994) refers to as "level-two inference", as was done in Ward and Vessey (Working Paper), is only one type of

generalizability. Positivist case study research as employed for this dissertation also requires generalizing from the theory to different settings (Lee & Baskerville 2003, pg. 17). Generalizing from theory to different settings is arguably the most important form of generalizability for business school research because it allows the theory to be applied to additional portions of the real world (Lee and Baskerville 2003). This leads to the research question:

> *Research Question 1: How does the organization's contextual setting impact the pattern of change in the internal alignment factors?*

3.1.2 Proposition and Hypothesis Development

This section develops propositions and hypotheses designed to test the effect of the organization's contextual setting on the pattern of alignment among the four internal alignment factors. The specific contextual aspects to be examined are introduced followed by the propositions and related hypotheses. The size of the firm is addressed first followed by the formality of IS strategy.

3.1.2.1 Firm Size

The firm studied by Ward and Vessey (Working Paper), with revenues of approximately $250 million, is classified as a midsized firm. It is possible that the firm's size limited the need for IS alignment and limited the resources available to align the IS with the organization. The organizational context of the original case site begs the question of whether a larger firm would have more sophisticated mechanisms to realign the alignment factors due to greater need and greater resources.[3] While a pattern of realignment in larger firms would be consistent with the synchronized view of alignment, TAGA, due to the short term decoupling of the alignment factors, suggests that firm size

[3] Firms with annual revenues in excess of $1 billion are considered large.

is not a determining factor in the pattern of alignment. These arguments lead to the first proposition:

> *Proposition 1: Firms exhibit decoupled patterns of IS alignment, independent of firm size.*

Because the theory of alignment as guided adaptation contradicts the prior theory that views alignment as synchronization, creating rival explanations based on the two theories provides a way to test the theories (Lee 1989; Yin 1994). One of the hypotheses will be ruled out, providing support for the other theoretical explanation. Therefore a hypothesis based on each theory is presented. Hypothesis "a" refers to the theory of alignment as synchronization while Hypothesis "b" refers to the theory of alignment as guided adaptation.

Based on proposition 1, therefore, the first hypotheses to be tested are:

> *Hypothesis 1a: Large firms exhibit traditional patterns of alignment as synchronization where a change in one factor is related to changes in all four internal alignment factors.*

> *Hypothesis 1b: Large firms exhibit decoupled patterns of change among the four internal alignment factors.*

3.1.2.2 Formality of IS Strategy

Similar to firm size, it is possible that the presence of a formal IS strategy could provide the motivation and processes for a synchronized pattern of alignment. In an organization that has a strategic view of IS, one might expect changes in all, or in the majority of the factors because the formalized strategy and processes act as an alignment mechanism resulting in change in the other factors to bring them back into alignment (Sabherwal et al. 2001).

Because TAGA was observed in a firm without a formal IS strategy, one might think that the lack of synchronized changes in the alignment factors observed by Ward and Vessey (Working Paper) may apply only to firms with a non-strategic view of IS. However, TAGA suggests that it is the short term decoupling of the factors and not the lack of a formal IS strategy that leads to the decoupled patterns of change among the alignment factors. This leads to the following proposition:

> *Proposition 2: Firms with a strategic view of IS will exhibit decoupled patterns of IS alignment.*

In this research we examine both IS strategy and IS planning as indicators of a firm's strategic view of IS. Although related, based on existing literature, we view IS strategy and IS planning as representing different aspects of a firm's view of IS strategy.

We include IS planning as a part of the strategic view of IS because the strategic role of IS in an organization traditionally has been researched as strategic IS planning. Strategic IS planning represents a process through which management reviews the role of IS and plans its use, typically in order to align the use of IS with the business strategy (see for example, Doherty, Marples & Suhaimi 1999; Lederer & Sethi 1996; Henderson & West 1979; Raghunathan & Raghunathan 1994).

We include IS strategy as a part of the strategic view of IS because of its direct relevance to the strategic view of IS. In Section 2, IS strategy was defined in terms of the IS specific strategic initiatives. While frequently inadequately defined in the literature, a review of current literature shows that IS strategy most often refers to the way a firm uses technology to support its business strategy. For example, Sabherwal et al. (2001) identified categories of how IS was being used to "impact the organization", while

Ciborra (1992) states that strategic IS is, in part, "a set of guidelines indicating how IT can support the business." Defining IS strategy in terms of the IS strategic initiatives or the means by which the firm is using IS to reach its goals is consistent with prior use. Because IS strategy is defined separately from IS planning, IS strategy is measured separately from IS planning.

To examine how a firm views IS strategically, we have developed hypotheses to test both the degree of formalized IS planning and the degree of formalized IS strategy. The concepts of formalized IS planning processes and IS strategy focus on how formalized the IS strategic initiatives and IS planning process are; that is, the degree to which management has determined and documented the IS Strategy and IS planning processes. As noted above, hypothesis "a" is as predicted by alignment as synchronization and hypothesis "b", is as predicted by TAGA.

> *Hypothesis 2a: Firms with a formal IS planning process exhibit traditional patterns of alignment as synchronization where a change in one factor is related to changes in all four internal alignment factors.*
>
> *Hypothesis 2b: Firms with a formal IS planning process exhibit decoupled patterns of change among the four internal alignment factors.*
>
> *Hypothesis 3a: Firms with a formal IS strategy exhibit traditional patterns of alignment as synchronization where a change in one factor is related to changes in all four internal alignment factors.*
>
> *Hypothesis 3b: Firms with a formal IS strategy exhibit decoupled patterns of change among the four internal alignment factors.*

3.2 Phase II –Examining Factors that Influence Change in the Alignment System

Phase II examines the triggers of change in the alignment factors by developing dimensions of external change. Developing dimensions of external change is a necessary step in understanding the effect of external change on the internal structure of an

alignment factor. Once the dimensions of change are investigated, the research can move forward with a focus on how IS can be structured to enable the adaptation process.[4]

The motivation for the research is based on TAGA and the related theoretical foundation of complexity theory. Complexity theory is introduced in the next section. Then Phase II research is presented.

3.2.1 Implications of Complexity Theory for Factors that Influence Change in the Alignment System

TAGA, with its systems theory approach, focuses on explaining alignment via the interaction between the alignment factors and their outer environments. Further theoretical insight is necessary, however, to understand the internal structure of the alignment factors. Complexity theory shows promise in this regard. The combined theoretical perspective of complexity theory and TAGA provides a holistic approach that can be used to develop the role of information systems in enabling the adaptation process.

Complexity theory shares TAGA's roots in evolutionary theory and similarly views an organization as a complex system subject to both uncontrollable external forces and the guiding forces of human actors. At the root of complexity theory is the premise that, although a single system in isolation may be a simple system, complexity emerges as a result of the interaction among mutually-adaptive systems (Axelrod & Cohen 2000).

Complexity theory provides further theoretical insight in two ways. First, although TAGA includes a role for management, complexity theory is further developed in terms

[4] The terms "enable" and "constrain" will be used to describe the role of IS in the alignment process. The terms "enable" and "constrain" have been use frequently in the literature (Allen & Boynton 1991; Boynton 1993; Ives et al. 1993; Luftman, Papp & Brier 1999; Luftman & Brier 1999; Weill & Broadbent 2000;), but not well defined. Webster's New World Dictionary defines enable as "the means to make able or to provide with means," while constrain is defined as "to restrain or hold back." In contextual terms, when a subsystem is able to adapt to changes in its outer environment, it enables (i.e., supports and facilitates) organizational adaptation. When, on the other hand, a subsystem is unable to respond to changes in its outer environment without changes to its internal structure and functioning, then the subsystem constrains the ability of the organization as a whole to adapt to changes in its external environment.

of separating the role of management from the information systems in that it recognizes explicitly that the two interact to influence the evolutionary path the firm travels. Second, complexity theory provides a way to view the role of information systems as an enabler of, or as a constraint on, the organizational system's adaptation process.

Using complexity theory, the role of management in TAGA can be viewed as that of a human agent. Complexity theory views a complex system as a population of agents (Axelrod & Cohen 2000). An agent, frequently a human actor, is something that has the ability to interact with its environment or with other agents and has the capability to take action that leads towards a goal or goals (Axelrod & Cohen 2000). The agents have varying skills, knowledge, and experience that impact their ability to interact with artifacts.

Artifacts are objects, such as a hammer or a computer, that have specific properties but do not have the ability to initiate the interaction with an agent (Axelrod & Cohen 2000). Artifacts have characteristics that can evoke certain actions on the part of an agent, increasing the likelihood that an agent will initiate a certain interaction (Axelrod & Cohen 2000); for example, the characteristics of a hammer increase the likelihood that an agent with the goal of driving in a nail would more likely interact with a hammer than a computer.

From the perspective of TAGA, the organization can be viewed as a system (the alignment system) composed of subsystems (the alignment factors). According to complexity theory, the inner structure of a subsystem is comprised of human agents and artifacts. Within the subsystem, human agents interact with artifacts to move towards the system's goal or goals.

Recall from Section 2.2.4 that the short-term independence between a subsystem and its coexisting subsystems, allows the subsystem to adapt to changes in its outer environment. The ability of the organization as a holistic unit to adapt to change in its external environment depends on the ability of each of the subsystems, individually, to adapt to the changes in their outer environment. When a subsystem can no longer adapt and requires a change to its internal structure, the organization as a holistic unit cannot continue towards its goals until the internal structure of the subsystem is altered to meet the changing needs of the environment. Viewing the organization as a complex alignment system that depends on the ability of each alignment factor (that is, each subsystem) to adapt to change, the alignment factors either enable or constrain the organization from moving towards its goals.

3.2.2 Guiding the Adaptation Process

Combining the theoretical perspective of complexity theory and TAGA, as described in Section 3.2.1, the firm can be viewed as a sociotechnical system that recognizes and combines the uncontrollable, changing environment of a firm with the ability of management to guide the way the organization adapts to its environment, either by reacting to, or anticipating, change in the environment. Management, as human agents, creates and interacts with the organizational artifacts. Managers can guide the organization towards its desired future state by manipulating the internal structure of the organization in a way that allows the organization, to the extent possible, to maintain an invariant relationship to its environment.

Successfully guiding the way a man-made system responds to its environment requires determining the current state of the system, establishing the desired future state,

and developing paths by which the system can move towards its desired future state (Merry 1995). Management must act upon either the outer environment of the alignment factor or its inner environment to reduce the distance between the existing state and the desired state. By definition, however, the outer environment is largely uncontrollable, leaving the inner structure of the system as the primary focus of management's manipulation.

Lack of management control over the outer environment does not mean that the outer environment is irrelevant. On the contrary, recall that management must understand the outer environment and the interface between the outer environment and the subsystem in order to understand how to best structure the subsystem for goal attainment (Simon 1996). It is the complexity of the environment and the uncertainty that complexity creates that drives the need for adaptation (Simon 1996). Therefore, understanding the environment is essential to determining how adaptable the system must be to maintain an invariant relationship with its environment and to pursue the system's goals in a constantly changing environment.

Adaptability, however, is not obtained without cost. An organization that is adaptable must have characteristics that allow it to be sufficiently flexible to enable change (Stalk, Evans & Shulman 1992). If an organization is too flexible, firm resources will be wasted. By understanding the environmental demands the system needs to meet, management may be able to make decisions that balance the need for adaptability in its systems with the costs required to create the adaptability. The key role for management, then, is to structure and use the subsystems of an organization in a way that matches the nature of the inner environment to the nature of the outer environment in which the system must

function (Merry 1995). In other words, the more change in the outer environment, the more adaptable the inner structure of a system must be to accommodate the change over time.

While the theory of alignment as guided adaptation applies to the entire alignment system, the goal of this dissertation is to focus on IS alignment, which can be viewed as a subset of overall alignment. Specifically, IS alignment relates to the use of information systems' strategies and structures and process to support the overall alignment process and hence the ability of the organization to adapt to its environment. The general argument applied to all of the alignment factors can be applied to the specific factors of IS strategy and IS structures, which are viewed as a subsystem of the alignment system. This is referred to as the IS subsystem.

The first step in understanding how information systems enable the adaptation process is to examine the characteristics of the environment that the information systems must be structured to accommodate. We must be able to determine the nature of the outer environment in order to match the internal structure of the IS subsystem with the needs of the outer environment. Only by understanding the nature of external change, can we gain an understanding of how information systems should be structured.

It is therefore proposed that the next step in this stream of research is to examine the characteristics of change in the outer environment of an alignment factor by developing dimensions of external change that can then be applied specifically to IS.

3.2.3 Change in the Outer Environment of an Alignment Factor as the Trigger for Adaptation

TAGA suggests that change in the outer environment drives the adaptation of an internal alignment factor. Little is known about what characteristics of change in the

outer environment trigger adaptation in an alignment factor. The lack of knowledge of the characteristics of environmental change leads to the following research question for Phase II:

> *Research Question 2: What characteristics of change in the outer environment impact the adaptation of an internal alignment factor?*

Recall from Section 2.2.1 that the ability of a system to accomplish its goals depends only on a few key characteristics of the alignment factor's outer environment and not on the details of the environment (Simon 1996). The alignment factor can be designed to address the most relevant characteristics and structured to maximize the length of time it can maintain an invariant relationship with its environment. The result is a system that, due to its internal design, is better able to achieve its goals even when there is change in its outer environment (Simon 1996).

Also recall from Section 2.2.1 that TAGA suggests that the impact of a change in the outer environment on an internal alignment factor depends on how the change in its outer environment interacts with the goals and composition of the internal alignment factor. The need for change in each of the internal alignment factors depends on the ability of each factor to continue to serve its organizational purpose given the nature of the changes to its outer environment. An environmental change that requires one alignment factor to alter its internal structure may not be great enough to require other individual alignment factors to change concurrently.

To accommodate the view of change as the trigger for adaptation, we need to understand what aspects of change are important in assessing the impact of external change on the structure and function of the alignment factor. Change, therefore, might be best examined from the perspective of the characteristics of change, referred to here as

"dimensions," that can measure the significance of a change in the outer environment on the internal structure of an alignment factor. Understanding the dimensions of change facilitates predicting whether an alignment factor can adapt to the change or will require change to its internal structure to accommodate the change. Understanding when the internal structure of an alignment factor requires change is the first step towards understanding how to structure the alignment factor to enable organizational adaptation.

The following four sections identify theoretically based dimensions of change by drawing upon prior research and the theory of alignment as guided adaptation to develop these dimensions. Specifically, it is proposed that change varies by level, magnitude, and pace, as well as by the three dimensions combined.

3.2.3.1 Level of Change (Hierarchy)

The first dimension of change that is seen as important in determining the impact on the alignment factors is the level of change. TAGA is a multilevel model that examines alignment at a system level (the alignment system) and at a subsystem level (the internal alignment factors). TAGA's multilevel approach establishes a hierarchical structure to the alignment factors (see Figure 2.2).

According to TAGA, the level of change likely to require change in other alignment factors is change that is initiated higher in the alignment system hierarchy. Adaptation occurring at the organizational level is triggered by change in the external environment or in the strategic intent. Adaptation occurring at the level of the individual internal alignment factors is triggered by the changes in the outer environment. Change in the outer environment of the individual internal alignment factors includes change to any of the other internal alignment factors. For example, a change in strategy is more likely to

trigger internal change in the lower level alignment factor of organizational structure than vice versa (Amburgey & Dacin 1994; Chandler 1962).

As noted in Section 2.2.2, the hierarchy is not a strict hierarchy in which a higher-level change is required to initiate change in a lower level alignment factor. TAGA recognizes that the other dimensions may dominate the interaction between the external change and the alignment factor. For example, a lower level change may be of such great magnitude (see Proposition 4) that it causes a change in a higher level. Proposition 3 indicates that a higher level change is more likely to result in changes in lower levels than vice versa but does not indicate a direct causal relationship between the higher level change and changes in lower level alignment factors.

The following impact of level of change is proposed:

> *Proposition 3: The higher the level in the alignment hierarchy at which change occurs, the greater the likelihood that the internal structure of an alignment factor will need to be altered.*

3.2.3.2 Magnitude of Initiating Change

The second proposed dimension of change is magnitude. The most common attempts to define and measure change are via its magnitude (for example: Amburgey & Dacin 2001; Huff, Huff, & Thomas 1992; Huff & Huff 1995). The magnitude of change represents the size of the change (Huff & Huff 1995). The magnitude of change has been used in examining changes to business strategy (Huff & Huff 1995). Amburgey and Dacin (1994) also determined that the magnitude of change in strategy increases the likelihood of a corresponding change in structure and vice versa.

The theory of alignment as guided adaptation indicates that a change in any one of the alignment factors perturbs the environment of the others. Thus it is expected that the

magnitude of the motivating trigger (change) increases the likelihood that change in one alignment factor will necessitate change in the internal structure of other factors. For example, implementing a new enterprise wide application is more likely to trigger changes in other alignment factors than upgrading a CAD program that only affects the engineering department.

> *Proposition 4: The greater the magnitude of change in the outer environment, the greater the likelihood that the internal structure of an alignment factor will need to be altered.*

3.2.3.3 Pace of Change (Frequency)

The third dimension of change proposed is the pace of change. The pace of change represents the rate at which change in the environment occurs. The pace of change in the outer environment is likely to be positively correlated with the need for alignment factors to alter their internal structure. To measure change from a process perspective requires a dimension that can capture the "rate" or the number of occurrences of change over a unit of time. Tushman and Romanelli (1985) proposed a similar concept indicating that the greater the rate of change in the environment, the more likely the organization would need to change its strategy, power, structure, and controls. Hidding (2001) suggested a similar dimension, stating that the speed of change in the environment determines the length of a product's competitive advantage. The underlying argument of both Tushman and Romanelli (1985) and Hidding (2001) is that the rate of change in the environment impacts the rate of change within an organization (i.e., changes to strategy, organizational structures, or product life).

> *Proposition 5: The greater the pace of change in the outer environment, the greater the likelihood that the internal structure of an alignment factor will need to be altered.*

3.2.3.4 Dynamism of Change

Although each dimension is proposed as a separate measure, the dimensions apply concurrently. Change in the outer environment, therefore, can be characterized by all three dimensions: the level, the magnitude, and the frequency of the change in the outer environment. The combined dimensions can be viewed as a measure of how dynamic the environment is; the more dynamic the environment, the more likely that the internal alignment factors will no longer fulfill their purpose, resulting in a need for the internal structure to change.

Consider an outer environment that has small but frequent changes. Any specific change may be of such limited magnitude that is does not have a substantial impact on the internal structure of an alignment factor, but if the change is high in the alignment hierarchy and occurs frequently, the combined nature of the changes could trigger the need for the internal structure of an alignment factor to change. The interaction of any combination of level, magnitude, or frequency is likely to have a greater effect on the need to alter the internal structure of an internal alignment factor than any single dimension in isolation.

> *Proposition 6: The more dynamic the outer environment (greater the level, magnitude, and pace of change), the greater the likelihood that the internal structure of an alignment factor will need to be altered.*

4 Chapter 4 – Research Method

To address the research questions presented above, multiple case studies were conducted using a positivist approach (Yin 1994). A case study is the preferred research method for several reasons. First, the primary research question is explanatory in nature, requiring examination of change events to understand how information systems can be used by an organization to adapt to its environment. A case study is appropriate when a "how" question is being asked (Yin 1994; Benbasat, Goldstein, & Mead 1987), particularly when the research is examining events over which the researcher has little or no control.

Second, this research focuses on identifying patterns of change events occurring over time and examining the relationships between the factors related to each change event. It is best to derive this understanding and knowledge of the patterns of change events through in-depth interviews with individuals familiar with the company and through examination of documentation, which can be used to triangulate the change events.

Third, a case study design is appropriate in the early stages of theory testing for which there are no prior existing measurement instruments (Yin 1994). The theory of alignment as guided adaptation is in the early stages of theory testing and there are no prior existing instruments for measuring the constructs.

Finally, a case study provides a rich environment that allows the researcher to understand the nature and complexity of the phenomena (Benbasat et al. 1987). Other research methods such as survey or experiment would not permit the identification of

patterns of change events and the rich description and detail required to understand the relationships between the change events and alignment factors.

4.1 Testing Propositions and Hypotheses Using Pattern Matching

We used controlled deductions based on empirical data (Lee 1989) for testing the theory of alignment as guided adaptation. These controlled deductions take the form of theoretically-derived propositions that can be falsified, as seen in Chapter 3. Propositions are essential for a rigorous case study research design because they link the research questions to the data to be collected and keep the research focused on answering the research question (Yin 1994). The data is linked to the propositions using "pattern matching" (Yin 1994; Lee 1989), a technique that allows a theoretically-predicted pattern to be matched with the pattern empirically derived from the data.

In addition to the use of propositions in all phases of the research, Phase I also tests falsifiable hypotheses using pattern matching (Yin 1994; Lee 1989). Phase I uses hypotheses because the independent and dependent variables have been developed in sufficient detail in prior research to allow testing of hypotheses (Ward and Vessey Working Paper) and because the use of rival hypotheses allows one of the hypotheses to be ruled out (Lee 1989; Yin 1994).

Propositions, only, are stated in Phase II. First, Phases II represents a new area of investigation. Although the variables are operationalized in Section 4.4, there is no prior research to provide validated measures for the development of hypotheses. Second, it is important to note that the process orientation of the relationship among variables is probabilistic and not causal. We looked, therefore, to establish a relationship between

variables based on a "preponderance of evidence" (see later) and not on statistical testing, making the higher level of abstraction of a proposition appropriate.

4.2 Site Selection

We selected our research sites based on our theory in such a way that we achieved both theoretical and literal replication (Yin 1994). Theoretical replication represents the selection of case sites so that they produce "contrasting results but for predictable reasons" (Yin 1994). Theoretical replication is similar to conducting multiple experiments where the expected outcomes vary based on variations in testing the boundaries of the theory. Literal replication (reliability) represents the testing of theory in an essentially similar setting to determine whether similar results are produced across cases. Literal replication is similar to conducting multiple experiments with the same predicted outcomes (Yin 1994). The combination of theoretical and literal replication "provides the vehicle for generalizing to new cases (Yin 1994)," the most important form of generalizability for business school research (Lee & Baskerville 2003).

Studies were conducted at three organizations. The first case site (PlumbCo) was a midsize corporation with a formal IS strategy and planning process. Testing TAGA in organizations with formal IS strategy and planning processes resulted in theoretical replication.[5] The potential confounding with organizational size was controlled for by focusing on an organization of similar size for the first case site. Hence differences in the alignment process from the original case are attributable to the effect of formal IS strategy and planning processes.

[5] The original case site in which the theory of alignment as guided adaptation was developed is not examined in this research. It is included only to serve as a base-line upon which the additional case sites can provide theoretical and literal replication of the research conducted in the development of TAGA. Details of the original case can be found in the paper by Ward and Vessey (working paper)

To test the proposition that the alignment pattern is independent of firm size, case sites 2 (PartCo) and 3 (MotorCo) were large firms. Larger firms may have more sophisticated processes by which alignment as synchronization may occur, processes that may be lacking in a midsize firm. The second case site (PartCo) was a Fortune 500 supplier to the automotive industry and provides theoretical generalizability of TAGA, to firms of much larger size. The third case site (MotorCo) was a division of a Fortune 200 company. An embedded unit of analysis was used at case site 3 where a division of the company was examined. The two large companies, combined with the original case site and case site 1, provides theoretical and literal replication based on both the size of the organization and the formality of IS strategy and planning.

4.3 Data Collection

The primary source of evidence for this study was semi-structured interviews with archival documents used as a secondary source. Interviews were conducted with ten high-level business and IS managers at case sites 1 and 2. Eleven high-level business and IS managers were interviewed at case site 3. See Tables 4-1a, b, and c for titles and tenure of those interviewed. The interviews were conducted on site, and in private, that is, one-on-one with the interviewee. All interviews were strictly confidential; only the researchers have the ability to associate the confidential information with its source.

Title	Tenure with Company
Director of Information Technology	9
Director of SAP Center of Excellence	10
Director of Logistics	10
Director of Supply Chain Systems	28
Manager of Supply Chain, SAP Center of	28
IS Manager, FI/HR	17
IS Manager, SAP COE, Sales/Marketing	10
Corporate Accounting Controller	20
Human Resource Manager	10
Business Systems Analyst	14

Table 4-1a: PlumbCo Interviewees

Title	Tenure with Company[6]
Senior V.P. and CIO	5
V.P. Information Technology	6
V.P. of Technology Infrastructure and Operations	6
V.P. Worldwide Operations	21
V.P. and G.M. CVE& Specialty Products	3.5
V.P. Truck & Industrial Products	25
Director, Technology Integration	15
Director of LVS Finance	14
Director of Program Management Office; LVS IT	20
Manager of Business Systems Solutions, North	7

Table 4-1b: PartCo Interviewees

[6] The tenure date for employees of PartCo includes their time with the companies that merged in 2000 to form PartCo.

Title	Tenure with Company
V.P. of Information Technology	33
Director of Engineering Administration & Systems	20
Director of Information Technology	21
Director of Marketing and eBusiness	10
Director of Oracle Application Development	26
Director of eBusiness	8
eBusiness Leader	8
Director of Oracle Programming	15
Manager of Engineering Systems	19
I.T. Program Manager	7
Program Manager, Engineering/Configurator	11

Table 4-1c: MotorCo Interviewees

A semi-structured interview guide (see Appendix A) consisting of open ended questions and references for the interviewer was used to guide the interviews. The use of a semi-structured interview guide served to standardize the data collection from the interviews, increasing replicability, and minimizing interviewer bias, thus increasing reliability across interviews and cases (Yin 1994). The questions required respondents to identify change events and their impact on the alignment factors. The interviews were recorded and transcribed.

Additional data was obtained from different types of documentation. SEC and other regulatory filings, when available, were used to gain a better historical perspective on the company and to triangulate events and dates described during the interviews. Company promotional material such as brochures and the company web sites were also examined to triangulate evidence from the interviews.

4.4 Operationalization of Variables

This section operationalizes the variables in the propositions and hypotheses. The variables are presented according to the phase in which they are used.

4.4.1 Phase I

This section operationalizes firm size, formality of IS strategy and planning, and the alignment pattern for both alignment as synchronization and alignment as guided adaptation. Firm size and degree of formalized IS strategy and IS planning are the independent variables in this phase of the research. Firm size was operationalized based on firm revenues. Firms with revenues between 20 million and 1 billion dollars were defined as "midsized" and firms with revenues over 1 billion dollars were defined as "large."

Formalized IS strategy and IS planning were operationalized using an instrument adapted from Segars and Grover's (1999) profile of strategic information systems planning. The instrument was used to assess the degree of formalized IS strategy and planning processes at each case site. Respondents were asked to complete a short survey with ten questions (See Appendix A). The first five questions were taken directly from Segars and Grover's (1999) validated instrument to assess the formality of IS strategy and planning. Although this instrument does not specifically address the degree of formalized IS strategy, the domains of IS planning and IS strategy are similar and the second five questions were an adaptation of Segars and Grover's instrument designed to prompt the interviewee to respond to similar inquires regarding the degree of formalized IS strategy.

The dependent variable is the pattern of alignment. The pattern of alignment was operationalized based on the patterns of change events in the alignment factors. Interviewees were asked to identify change events in the alignment factors. A change to either strategic intent or strategic initiative was considered as initiating an alignment episode (Ward & Vessey Working Paper) and the pattern of change in the internal factors

were examined. The alignment episodes were plotted on a chart similar to Figure 4-1. A vertical alignment or a stair step alignment where the changes were related, or coupled, represented evidence of the traditional alignment as synchronization, while disjointed or decoupled patterns indicated a pattern of guided adaptation.

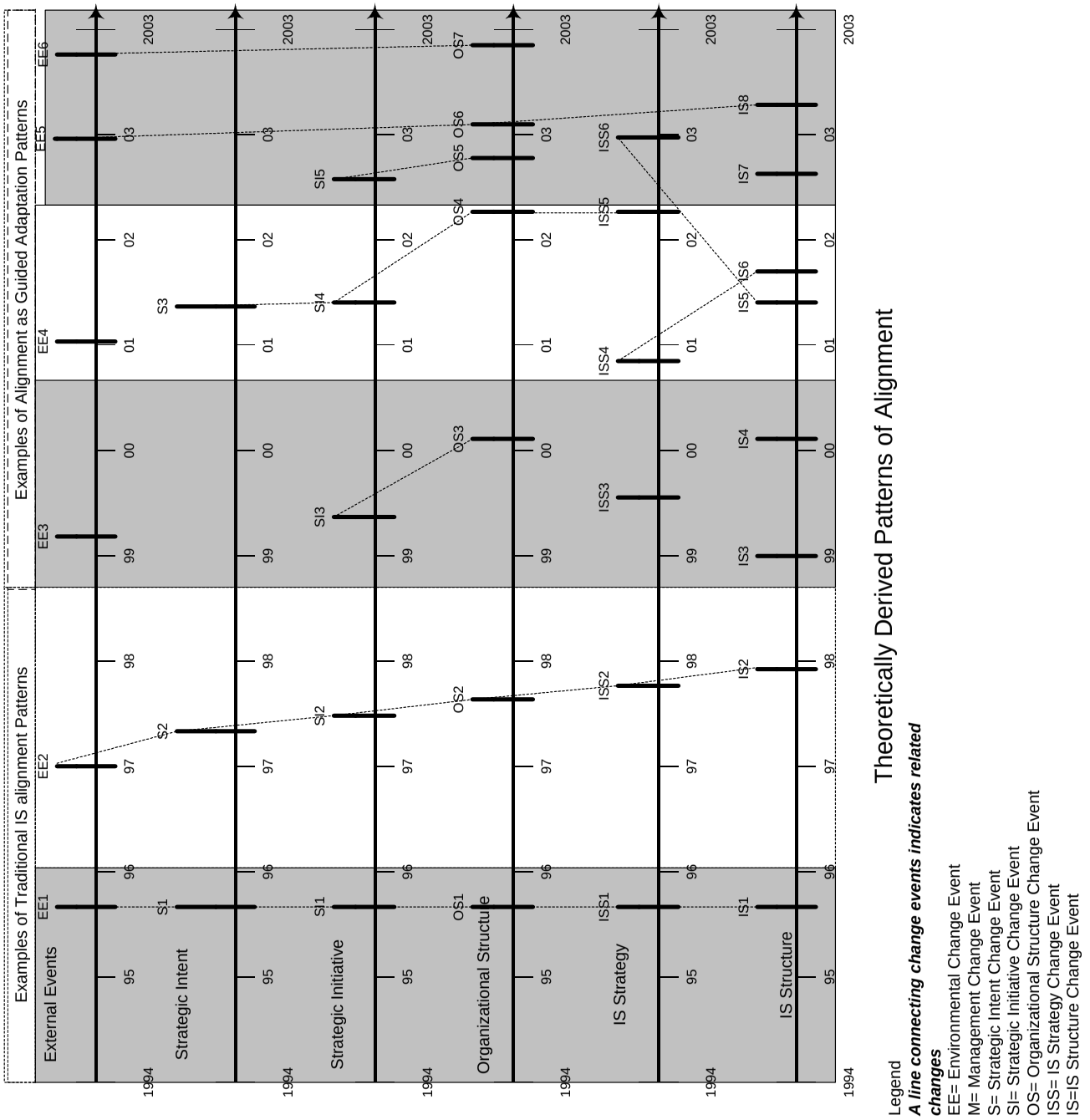

Figure 4-1: Theoretically Derived Patterns of Alignment

4.4.2 Phase II

Testing propositions three through six required the operationalization of the dimensions of change as the independent variables; change, however, is not a well defined concept (Huff & Huff 1995). There is limited guidance in the literature on how to measure change effectively and while a case study can be used to investigate a phenomenon that is not well defined, it still requires criteria by which the success of the research can be determined (Yin 1994). Thus this section operationalizes Phase II measures for the level, magnitude, pace, and dynamic nature of change. However, the lack of prior research limits the detail with which the measures can be defined.

Proposition 3 reflects the level of the initiating change as the independent variable. While we are not aware of prior research that measures the level of external change on alignment, the level was ascertained directly from the interview data as the level of the hierarchy at which the change occurred (see Figure 2-2). The dependent variable for Proposition 3 is the number of related changes in the levels resulting from the initiating change event. The dependent variable for Propositions, 4, 5, and 6, is operationalized as the number of related changes per alignment episode in the levels surrounding the initiating change event (both higher and lower levels).

Proposition 4 required the operationalization of the magnitude of change as the independent variable. To define magnitude of change, we drew on the research of Huff, Huff & Thomas (1992). According to Huff et al. (1992), change can be measured via magnitude which can be represented by the tension formed by the combination of "stress" and "inertia". Stress is directly related to change because poor performance requires change if the firm is to survive. On the other hand, inertia is inversely related to

change because it represents the existing sociological and structural aspects of the firm that resist change (Huff et al. 1992).

Thus a survey instrument was used to collect data on the magnitude of change events. Specifically, after the list of change events was established following the interviews, a follow-up survey was used requesting the interviewees confirm and provide feedback on the accuracy of the change events and to classify the magnitude of each event as either "high," "medium," or "low." Consistent with Huff et al. (1992) the interviewees were ask to consider the stress the change put the company under and the level of resistance to the change in determining the magnitude of each change event. A copy of the follow-up surveys can be found in Appendix A.

Proposition 5 required the pace of change to be operationalized. The pace of change represents the rate of change over a unit of time and was operationalized as the number of changes that occur at each level during a change episode.

Proposition 6 combined the independent variables from Propositions 3, 4, and 5 into an overall measure of environmental dynamism. The factors were combined by considering the magnitude and pace at each alignment level of each episode.

Additional detail on the measures for propositions 3, 4, 5, and 6 along with examples of how they were analyzed are provided in the following Data Analysis section and in the Chain of Evidence (Appendix B).

4.5 Data Analysis

The interviews were transcribed, reviewed manually, and then coded using N5 qualitative software. The transcripts were coded by grouping data related to the same change event and then by grouping these change events into episodes. The transcripts

grouped paragraphs and groups of sentences large enough to convey sufficient information so that they could be clustered into a change event without losing the contextual meaning. The coding was reviewed iteratively and recoded until no changes were being made to the groupings.

Change events were identified for each of the alignment factors. Events that occurred external to the firm, such as a change in a market condition or changes in regulatory environment, were coded as external events (see Table 4-2). Changes in strategy were coded either as a change in the strategic intent (goals) of the organization or as a change in a strategic initiative (Lovas and Ghoshal 2000). Changes in organizational structure were coded by looking for changes in corporate structures such as the creation of a new legal entity or a new operating entity. Changes in processes such as re-engineering or changes in manufacturing processes were also coded as organizational structure change events. Change events in the IS domain that relate to IS strategy and structure were similarly coded.

EE	External Environment	Changes that occurred external to the firm
SG	Strategic Intent	Changes in company goals
SI	Strategic Initiatives	Changes in business strategy that represent significant changes in the way the company does business
OS	Organization Structure	Changes in the way the organization is structured; defined as changes in organizational structure (as represented, for example, in the organization chart) or changes in significant management responsibilities
IS	IS Strategy	Changes in strategic initiatives that represent significant changes in the way the company utilizes IS
IT	IS Structure	Changes in IS structure and/or processes

Table 4-2: Definition of Events

The change events were coded into episodes. An episode represents a time period delimited by a change in the organization's strategic intent or strategic initiatives (Ward & Vessey Working Paper). An episode was initiated by a change in either strategic intent or strategic initiative and lasted until the next change in strategic intent or strategic initiative which began a new episode.

The episodes and change events were organized as a time ordered matrix (Miles & Huberman 1994), an analysis process referred to as a temporal bracketing strategy by Langley (1999). The data in the tables were also charted graphically by alignment factor with lines connecting related change events (see Figure 4-1).

Coding the data in table and figure form reduces the complexity of the change events and their inter-relationships by reducing them to a condensed, logically coherent, framework that makes it easier and quicker to understand (Miles & Huberman 1994).

The interview data was the primary data and was analyzed based on a "preponderance of the evidence." The use of case study methodology, the lack of validated measures, and the process orientation of TAGA, prohibits the use of statistical analysis and requires the researcher to use discretion and judgment in analysis of the qualitative data. The multiple interviews as sources of data required the researcher to make decisions as to whether the data supported or not the propositions when perceptions of interviewees conflict.

4.6 Case Analysis

The first phase of the case analysis was the development of case write-ups. The case write-ups were used to triangulate change events and resolve conflicting data from the individual interviews. The case write-ups, derived from a summary of all of the data collected for each case site, provided detailed information on the case and was provided

to the primary contact at the case site to confirm its accuracy. Discrepancies were resolved by reviewing the data and when necessary, by referring back to the original source for clarification until the discrepancies were resolved.

The second phase of the case analysis was the pattern matching to test the propositions and hypotheses. The patterns of change proposed by the propositions were matched with the actual patterns observed in the data. The patterns of alignment are summarized in tables and graphical displays. These displays were then examined to determine whether the change events within an episode represented a pattern of alignment as synchronization or alignment as guided adaptation.

The third phase of the case analysis was the analysis of the dimensions of change. The preponderance of the evidence approach described in Section 4.5 requires the researcher to examine the data in its entirety and to draw conclusions based on the totality of the evidence. It was unlikely, given the lack of direct causality and path dependence in process oriented research, that all of the episodes and event data would exhibit similar patterns. Therefore the researchers looked for similar patterns in the majority of episodes and events to determine whether the data did or did not support Propositions 3, 4, 5, and 6.

The researchers recognize that there are many ways to analyze qualitative data. The following section, therefore, provides the basic logic used in analyzing Propositions 3, 4, 5, and 6. The Chain of Evidence (Appendix B) provides detailed examples of how the data was analyzed for each proposition.

Analysis of Proposition 3 was analyzed based on the dimension of level to determine the number of related changes in the levels above and below the initiating change event.

The data was presented graphically similarly to Figure 4-1 to examine the level at which change events occurred. The key to interpreting the data was to compare the number of related change events triggered by higher level initiating changes with the number of related change events triggered by lower level initiating changes. If in the majority of initiating change events, the higher level initiating changes resulted in a greater number of changes in the alignment factors than change events that were initiated at lower levels; the data was interpreted as supporting proposition 3.

Proposition 4 was analyzed based upon the survey of event magnitude. The interviewees' responses were combined and averaged for each event to determine whether the respondents perceived the event to represent a "high," "medium," or "low" magnitude of change to the firm. Additionally, secondary sources of data, when available were analyzed to allow for triangulation.

The single change events and related lower level change events were analyzed to determine whether Proposition 4 is supported. The magnitude of each initiating change event was compared to the number of related change events associated with each initiating change event. P4 was considered supported when change events of greater magnitude were more likely to be related to other change events than change events of lesser magnitude.

Proposition 5 addressed the pace of change at each level of alignment factor by episode. Proposition 5 was analyzed by comparing the number of change events at each level for each episode to the number of related change events. When an increased rate of external change was more likely to result in changes in an internal alignment factor, P5 was considered supported.

Proposition 6 was analyzed by combining the measures of level, magnitude, and pace of change. See Appendix B for an example of how the measures may be combined. P6 was considered supported when changes of greater level, magnitude, and pace were more likely to result in changes to internal alignment factors than were changes of lower magnitude, pace, and level.

4.7 Methodological Rigor

As with all methodologies, a case study methodology has criteria that must be applied to evaluate the quality of the research. Positivist case study research shares with other forms of positivist research the need to establish construct validity, internal validity, external validity, and reliability. These criteria, as applied to positivist case study research, are addressed in Table 4-3.

Data Quality Validation Method	Construct Validity	Internal Validity	Reliability	Generalizability
Use of Multiple Sources of Evidence (Yin 1994)	Yes			
Use of Chain of Evidence (Yin 1994)	Yes		Yes	
Validation of Case Data Write-up by Primary Contact (Yin 1994)	Yes			
Examining Change Over Time (Yin 1994)		Yes		
Use of Pattern Matching (Yin 1994)		Yes		
Use of Case Study Protocol (Yin 1994)			Yes	
Use of Archival Documents (Yin 1994)			Yes	
Case Site Selection for Theoretical and Literal Replication				Yes

Table 4-3: Methodological Rigor

Construct validity is addressed by the use of multiple sources of evidence and the review of researcher documentation by key informants (Yin 1994). Interviews were conducted with individuals from different backgrounds (i.e. different areas and functions within the company), allowing for triangulation. By triangulating multiple interviews, we

were able to develop a common understanding so as to minimize any one individual's contextual bias. We also triangulated interview data with evidence from archival documents. Finally, construct validity is increased via the establishment of a chain of evidence (Yin 1994), which provided a logical link from the research question to the data. (See Appendix B).

Internal validity is addressed primarily through the use of deduction via pattern matching and examining change in the alignment factors over time (Yin 1994). The pattern matching of propositions and hypotheses to the data strengthens the causal links between the research questions and the data. Internal validity is likewise increased by the examination of IS alignment as a process that occurs over time which reduces the chance of including spurious relationships that may arise when phenomena are examined at an isolated point in time (Yin, 1994).

External validity in case study research is achieved via generalizability to theory (Yin 1994; Lee and Baskerville 2003). In a positivist study, a single case site can be viewed as a single experiment and a single case site can serve to provide disconfirming evidence of existing theory (Lee 1989). Therefore external validity is addressed directly via the research design, which provides both theoretical and literal replication, in the same way as do multiple experiments.

Reliability is addressed by the use of a case study protocol, which included semi-structured interview questions and outlines documentation for review. The use of a case study protocol allowed the researcher to conduct research in multiple case sites and to replicate the interview questions and documentation at each site. The chain of evidence

that allows others to follow the links between the research questions and the data that answers the questions also increased reliability (Yin 1994).

5 Results

This section presents the results of the research. It begins with an overview of the case studies conducted in this research and includes a focused summary of the observed patterns of alignment by case. The case results are then applied to the two phases of the research. Phase I results are presented by proposition and hypotheses. Due to the exploratory nature of Phase II, the results are presented by proposition only.

5.1 Overview of Case Study

The case study data was analyzed by coding the data into alignment episodes composed of change events in the alignment factors. As previously defined, changes in business strategy (strategic intent and strategic initiatives) were used to delimit change episodes. Each change event was identified with the following codes, both in the text and in the tables: EE – External Environment, SG – Strategic Goal, SI – Strategic Initiative, OS – Organizational Structure, IS – IS Strategy, and IT – IS Structure.

Each alignment episode is classified as either coupled or decoupled. A coupled alignment episode exhibits related changes to all four of the internal alignment factors and is consistent with alignment as synchronization. Episodes that do not exhibit related changes to all four of the internal alignment factors are considered decoupled. Decoupled changes are consistent with alignment as guided adaptation and are inconsistent with the notion of alignment as synchronization.

The case information presented here is intended as an overview of the company and a summary of the alignment episodes and events that form the basis for our findings.

Detailed company write-ups are presented in Appendix C. In total, 12 alignment episodes and 69 alignment factor change events were documented across the 3 case studies (see Table 5-1).

Number of Alignment Episodes/Events	PlumbCo	PartCo	MotorCo
Episodes	5	4	3
External Environment	6	3	12
Strategic Intent	2	1	1
Strategic Initiatives	5	4	4
Organizational Structure	3	4	6
IS Strategy	2	1	2
IS Structure	8	2	3
Total Events	26	15	28

Table 5-1: Summary of Alignment Episodes and Change Events

5.1.1 PlumbCo

PlumbCo is a U.S. - based international leader in flow control (plumbing) products for both the commercial and residential markets. It is a closely-held, mid-sized company with approximately $450 million in annual revenue. PlumbCo has 12 manufacturing facilities including facilities in Mexico and Poland that produce products such as plumbing values, fittings, and pipe products out of various plastics and metals. PlumbCo's market is mature, characterized by tough competition that is turning the product into a commodity. Its products are sold through wholesalers and major "big box" retailers such as Home Depot and Lowes. PlumbCo has a formal IS strategy and planning process and specifically identifies IS as being a strategic tool for competitive advantage.

There were five alignment episodes at PlumbCo during the ten year period (1995 – 2004) covered by this research (see Table 5-2 and Figure 5-1). These five alignment episodes represent 26 change events in the alignment factors (see Table 5-1).

"Alignment Factor"	Episode 1 – Developing an Infrastructure for Growth		
	Date Initiated	**Description**	**Trigger**
External Environment	Early Nineties and Continuing	Proliferation of Big Box Retailers (EE-1)	
	Mid-nineties and Continuing	Consolidation of Wholesalers (EE-2)	
Strategic Intent (Goals)	1995	Growth (SG-1)	Changes in Market Distribution Channels (EE-1)(EE-2)
Business Strategy/ Initiatives	1995	Developing a Technology Infrastructure (SI-1)	Growth Strategy (SG-1)
Organization Structure	1995	Eliminating Divisional Structure and Moved to a Functional Matrix Structure (OS-1)	Developing a Technology Infrastructure (SI-1)
	1995-1997	Consolidating Distribution from 15 to 4 Warehouses (OS-2)	Developing a Technology Infrastructure (SI-1)
IS Strategy	1996	Maintaining a Current Technology Infrastructure (IS-1)	Developing a Technology Infrastructure (SI-1)
IS Structure	1997	Implementing SAP R/3 (IT-1)	Developing a Technology Infrastructure (SI-1)

Table 5-2a: Summary of PlumbCo Alignment Episodes

"Alignment Factor"	Episode 2 – Leveraging Technology Infrastructure for Cost Savings		
	Date Initiated	**Description**	**Trigger**
External Environment	Late Nineties	Increasing Competition from Foreign Manufactures (EE-3)	
	1999	Buyback of Family-Owned Stock (EE-4)	
Strategic Intent (Goals)		No Change	
Strategic Initiatives	1998	Leveraging Technology Infrastructure for Cost Savings (SI-2)	Price Pressures (EE-1)(EE-2)(EE-3) and Buyout(EE-4)
Organization Structure		No Change	
IS Strategy	1998	No Change	
IS Structure	1999	Upgrade to SAP Version 4.0b (IT-2)	Initial IS Strategy (IS-1)

Table 5-2b: Summary of PlumbCo Alignment Episodes

"Alignment Factor"	Episode 3 – Implementing eCommerce		
	Date Initiated	Description	Trigger
External Environment			
Strategic Intent (Goals)		No Change	
Strategic Initiatives	1999	Introducing eCommerce (SI-3)	Up-to-date IT Infrastructure (IT-2)
Organization Structure		No Change	
IS Strategy		No Change	
IS Structure	2000	Go Live on SAP Human Resources (IT-3)	Initial IS Strategy (IS-1)
	2001	Upgrading to SAP Version 4.6c (IT-4)	Initial IS Strategy (IS-1)

Table 5-2c: Summary of PlumbCo Alignment Episodes

"Alignment Factor"	Episode 4 – Growing via Acquisition		
	Date Initiated	Description	Trigger
External Environment			
Strategic Intent (Goals)		No Change	
Strategic Initiatives	2002	Growth via Acquisition (SI-4)	
Organization Structure	2002	Acquired Regional Producer (OS-3)	Strategic Initiative for Growth Via Acquisition (SI-4) and Experience Converting Polish Sub(IT-5)
IS Strategy		No Change	
IS Structure	2002	Go Live with SAP at Poland Subsidiary (IT-5)	Acquisition Strategy (SI-6) and Acquisition (OS-3)
	2002	Converting Acquisition to SAP (IT-6)	Acquisition (OS-3)

Table 5-2d: Summary of PlumbCo Alignment Episodes

"Alignment Factor"	Episode 5 – Innovating via New Product Development		
	Date Initiated	**Description**	**Trigger**
External Environment	2000	Increasing Regulation of Hazardous Materials Content (EE-5)	
	2002	Inflation in Raw Material Prices (EE-6)	
Strategic Intent (Goals)	2002	Updated SLRP: Growth, Lean, and MAX (SG-2)	
Strategic Initiatives	2003	Innovation via New Product Development (SI-5)	Continued Price Pressures (EE-6), Increasing Regulatory Requirements (EE-5) and New Strategic Goals (SG-2)
Organization Structure		No Change	
IS Strategy	2003	Focus on Content Delivery (IS-2)	Updated SLRP (SG-2)
IS Structure	2003	Implementation of Business Warehouse (IT-7)	Content Delivery (IS-2)
	2004	Upgraded R/3 to Version 4.7 (IT-8)	Normal Maintenance

Table 5-2e: Summary of PlumbCo Alignment Episodes

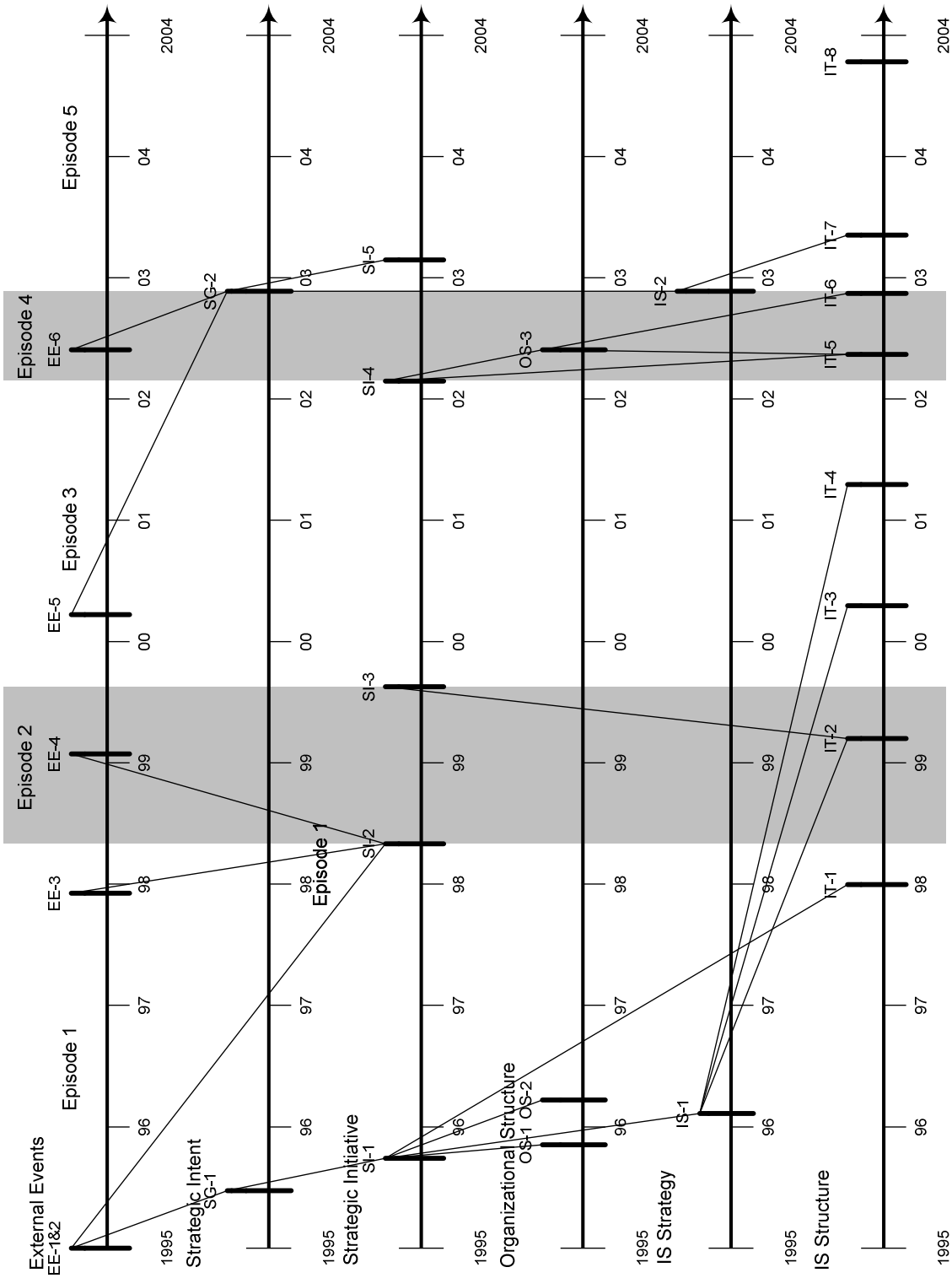

Figure 5-1: PlumbCo Timeline

5.1.1.1 Episode 1 – Developing an Infrastructure for Growth

Episode Summary - The first alignment episode at PlumbCo was a period of infrastructure development triggered by changes in the industry structure. The trend towards consolidation in the wholesalers and the emergence of big box retailers threatened PlumbCo's future by commoditizing the industry (EE-1 & EE-2). Management conducted a long-range strategic planning process as a first step in countering the evolving market forces. The long-range strategic planning process established growth as the strategic goal (SG-1). The new strategic growth goal, however, could not be supported by the current company infrastructure. PlumbCo established a strategic initiative to develop and maintain an up-to-date IS infrastructure that would enable it to provide services to customers that could differentiate PlumbCo from its competitors and enable growth (SI-1).

The growth goal and the strategic initiative to develop an IS infrastructure triggered changes in the organizational structure. The organization was restructured to form a functional matrix that leveraged the integrated information infrastructure (OS-1). The distribution process was also re-engineered to reduce the number of distribution centers and to rely on the technology for effective tracking of inventory and distribution (OS-2). Both IS strategy and IS structure were updated to support the growth goal and leverage the strategic initiative to develop an IS infrastructure. An IS strategy was developed to support the strategic goal and initiative by maintaining an up-to-date IS infrastructure (IS-1). The IS structure was established by implementing SAP R/3 (IT-1).

Alignment Summary - Episode 1 exhibited coupled changes in the alignment factors. The changes in the external environment triggered an evaluation and subsequent change to the strategic goals of the company. A new strategic initiative was established

and the organizational structure, IS strategy, and IS structure, were all altered to support the strategic goal.

5.1.1.2 Episode 2 – Leveraging the Technology infrastructure for Cost Savings

Episode Summary -The second episode involved changes in strategic initiatives designed to leverage the new IS infrastructure (SI-2). Once an ERP infrastructure is implemented and the organization has had time to adjust to the implementation, frequently organizations will go through a phase to leverage the new system (Markus & Tanis 2000). In PlumbCo's case, the company developed new strategic initiatives to change the inventory process, to develop metrics for measuring quality, and to centralize the purchasing process, by leveraging the new infrastructure.

Changes in the environment contributed to the development of these initiatives. First, the on-going pressures of a changing industry structure were continuing to place pressure on PlumbCo's profit margins (EE-1& EE-2). Second, during this period, foreign manufacturers were threatening PlumbCo's market share by undercutting price (EE-3). Third, PlumbCo is a closely-held company and there were family shareholders who wanted to be bought out (EE-4). The combination of these environmental factors led PlumbCo to focus on leveraging their IS infrastructure for cost effectiveness.

The prior strategic initiative, to develop a strategic IS infrastructure, resulted in an organizational structure, IS strategy and IS structure that was robust enough to remain adapted to the changed strategic initiative. There was a change in the IS structure, however, related to the IS strategy of maintaining an up-to-date IS infrastructure. The IS structure was upgraded to the latest SAP R/3 release (IT-2).

Alignment Summary - Episode 2 exhibited decoupled changes in the alignment factors. Continuing and new external pressures resulted in a change in strategic initiative, but no change in strategic intent. The existing organizational structure, IS strategy, and IS structure did not require realignment to support the change in strategic initiative that triggered Episode 2. The change in IS structure that occurred during this period was a result of the existing IS strategy and not the result of the newly implemented strategic initiative.

5.1.1.3 Episode 3 – Implementing eCommerce

Episode Summary - Episode 3 involved the implementation of ecommerce at PlumbCo (SI-3). The recent upgrade of the ERP infrastructure (IT-2) provided a portal for customers to check inventory availability, pricing, and other order related information, and allowed for the exchange of data with customers and suppliers via EDI. The increased interaction with customers enabled PlumbCo to manage customers' inventory directly, a process referred to as vendor managed inventory (VMI). The existing IS strategy (IS-1) of maintaining an up-to-date infrastructure provided the capabilities to support the strategic ecommerce initiatives and PlumbCo did not alter the organizational structure or the IS strategy or structure to support the new strategic initiative. PlumbCo simply leveraged existing capabilities to enable these new services.

During this episode, two changes to the IS structure occurred that were unrelated to the ecommerce initiatives. The first change to IS structure was the implementation of the SAP's human resources module (IT-3). The second change was a further upgrade of the ERP infrastructure in the form of a new release of SAP's R/3 (IT-4). Both changes were

driven by the proactive IS strategy and did not result in changes to the other alignment factors.

Alignment Summary - Episode 3 exhibited decoupled changes in alignment factors. A new strategic initiative leveraged the evolving IS structure and was consistent with the strategic intent established in Episode 1. The remaining alignment factors were still appropriately adapted after the change in strategic initiative and did not require realignment. The changes in IS structure were decoupled from the other alignment factors and were not linked to any other event changes within the alignment episode.

5.1.1.4 Episode 4 - Growing via Acquisition

Episode Summary -The fourth episode was introduced by a new strategic initiative, that of growth via acquisition (SI-4) and, similar to SI-3, was consistent with the existing growth strategy (SG-1). The acquisition strategy sought to leverage the excess capacity of PlumbCo's robust IS infrastructure. The target acquisition was a regional manufacturer of related plumbing products. PlumbCo believed that they could benefit by leveraging PlumbCo's excess IS infrastructure to lower the consolidated overhead costs and that the acquired product line would benefit from PlumbCo's national distribution channels thereby increasing the sales volume of the product line.

The acquisition initiative triggered a change to the IS structure (IT-5) as PlumbCo extended their IS infrastructure to PlumbCo's foreign subsidiary (IT-5). The decision to extend their IS infrastructure to their foreign subsidiary was to prepare the company for integrating the acquisition (SI-4) into the existing IS infrastructure. PlumbCo saw the experience and knowledge created by integrating their foreign subsidiary into the IS

infrastructure as essential to developing the skills required for making acquisitions that represented a greater financial risk of integration failure.

Once the foreign subsidiary was successfully integrated, PlumbCo moved forward with the acquisition. The acquisition impacted the organizational structure as it was integrated into PlumbCo (OS-3). Likewise the acquisition impacted the IS structure via its integration to PlumbCo's existing IS structure (IT-6). The acquisition initiative did not impact the IS strategy.

Alignment Summary - Episode 4 exhibited decoupled change among the alignment factors. The strategic initiative triggered changes in the organizational structure and IS structure. There was, however, no change to the IS strategy. Additionally, the first change to the IS structure was not an issue of realignment. Instead it served as an enabler of the acquisition strategy. The second change to IS structure was related to the change in the organizational structure.

5.1.1.5 Episode 5 –Innovating via New Product Development

Episode Summary -The final episode at PlumbCo was initiated by an update to the strategic long-range plan (SG-2) first introduced in 1995, an update that was heavily influenced by environmental factors. Specifically, continuing pricing pressures (EE-1 & 2) and regulatory changes (EE-5) combined with inflationary pressures on raw material prices (EE-6) to drive changes in the long-range plan.

The updated strategic long-range plan reaffirmed growth as the primary goal and formalized cost cutting as a secondary goal. In the past, the strategic initiatives to cut cost had been a byproduct of leveraging the new IS infrastructure. The new plan also

introduced the goal of meeting new regulatory requirements. The updated strategic goals led to a strategic initiative to innovate new products (SI-5).

The new focus on innovation filled several strategic needs. First, new product innovation could meet the changing regulatory requirements, a necessity to continue to sell products after the regulations are phased in over the next few years. Second, new products allow PlumbCo to grow their market share. Third, innovation could create product differentiation allowing PlumbCo to gain a strategic advantage over their competitors.

There was no change to organizational structure. PlumbCo did, however, update its IS strategy (IS-2) to meet the needs of the updated strategic long-range plan. The new IS strategy change focused on further leveraging the infrastructure to address strategic uses of the information generated by means of the IS infrastructure. In other words, the IS strategy changed from simply keeping the infrastructure current to a focus on content delivery.

The updated IS strategy did trigger a change in the IS structure. PlumbCo implemented a data warehouse (IT-7) designed to collect the information generated from the ERP infrastructure and provided tools that allowed the information to be applied for strategic gain. Consistent with maintaining an up-to-date IS infrastructure; PlumbCo again upgraded their version of R/3 (IT-8). It was a routine upgrade unrelated to the changes in either business or IS strategy.

Alignment Summary - Episode 5 exhibited decoupled change among the changes to the alignment factors. The environmental pressures led to a revision of the strategic intent. A new strategic initiative was put in place (SI-5) and the IS strategy (IS-2) and IS

structure (IT-7) were updated to realign the IS with the updated strategic intent. There was no change, however, to the organizational structure which remained adapted to the changes in its environment. An additional change occurred to the IS structure (IT-8), but this change was decoupled from the update to the strategic intent or the new strategic initiative.

Episode #	Pattern of Alignment
1	(4/4) Coupled
2	(2/4) Decoupled
3	(2/4) Decoupled
4	(3/4) Decoupled
5	(3/4) Decoupled

Table 5-3: Summary of PlumbCo Alignment Patterns by Episode

5.1.2 PartCo

PartCo is a large, publicly-held company that provides integrated systems, modules, and components for passenger, light truck, and commercial vehicles to the major automotive original equipment manufacturers (OEMs). PartCo was formed from the merger of two larger automotive suppliers. With $8 billion in combined annual revenues, PartCo is a global corporation with over 31,000 employees and 120 manufacturing facilities located in 25 countries. PartCo is structured into three divisions: Light Vehicle Systems (LVS), Commercial Vehicle Systems (CVS), and Light Vehicle Aftermarket (LVA). PartCo has both a formal IS strategy and a formal IS planning process, qualifying them as a case site according to the criteria established in Section 4.2.

While the other two cases covered a period of ten years, the merger represented a new company and employee consolidation and reassignment resulting from the merger made it difficult to collect data on either company prior to the merger. Data for PartCo,

therefore, covers a five-year period beginning with the merger in 2000. There were four alignment episodes at PartCo during the period from 2000 to 2004 representing 15 change events in the alignment factors (See Table 5-4 and Figure 5-2).

"Alignment Factor"	Episode 1 –Merging Two Well-Established Manufacturers		
	Date Initiated	**Description**	**Trigger**
External Environment	2000	Merger (EE-1)	
Strategic Intent (Goals)	2000	Become the #1 Supplier to the Automotive Industry (SG-1)	
Strategic Initiatives	2000	Focusing on Cost Cutting (SI-1)	Merger (EE-1)
Organization Structure	2000	Merging Management and Organizational Structures (OS-1)	Merger (EE-1)
IS Strategy		None	
IS Structure	2000	Consolidating IT Infrastructures (IT-1)	Merger (EE-1)
	2000	Removing of J. D. Edwards at Exhaust Division and Moving Back to Legacy Mainframe System (IT-2)	Merger (EE-1)

Table 5-4a: Summary of PartCo Alignment Episodes

"Alignment Factor"	Episode 2 –Assembling Modules		
	Date Initiated	**Description**	**Trigger**
External Environment		None	
Strategic Intent (Goals)		No Changes	
Strategic Initiatives	2001	Assembling Modules (SI-2)	Goal to be #1 Supplier (SG-1)
Organization Structure	2001	Moving Plants Next to Customer Plants (OS-2)	Assembling Modules (SI-2)
	2002	Reorganizing the Structure to Three Division (Merged ET into LVS and Created LVS, CVS, and LVA) (OS-3)	Merger (EE-1) and Assembly of Modules (SI-2)
IS Strategy	2001	Convergence Strategy (Consolidation and Standardization) (IS-1)	Merger (EE-1) and Assembly of Modules (SI-2)
IS Structure		No Change	

Table 5-4b: Summary of PartCo Alignment Episodes

"Alignment Factor"	Episode 3 – Meeting New Federal Emission Regulations		
	Date Initiated	**Description**	**Trigger**
External Environment	2000	Passing of New EPA Emission Standards to Take Effect 2007 (EE-2)	
Strategic Intent (Goals)		No Changes	
Strategic Initiatives	2001	Developing Commercial Products for New Federal Emission Regulations (SI-3)	New EPA Emission Standards (EE-2)
Organization Structure	2003	Acquiring Remaining Interest in Joint Venture (OS-4)	Developing Products to Meet 2007 EPA Requirements (SI-3)
IS Strategy		No Change	
IS Structure		No Change	

Table 5-4c: Summary of PartCo Alignment Episodes

"Alignment Factor"	Episode 4 – Attempting Hostile Acquisition		
	Date Initiated	**Description**	**Trigger**
External Environment	2002	Inflation in Raw Material Prices (EE-3)	
Strategic Intent (Goals)		No Change	
Strategic Initiatives	2003	Failed Attempt to Acquire Larger Company (SI-4)	Goal to be the #1 Supplier by 2010 (SG-1)
Organization Structure		No Change	
IS Strategy		No Change	
IS Structure		No Change	

Table 5-4d: Summary of PartCo Alignment Episodes

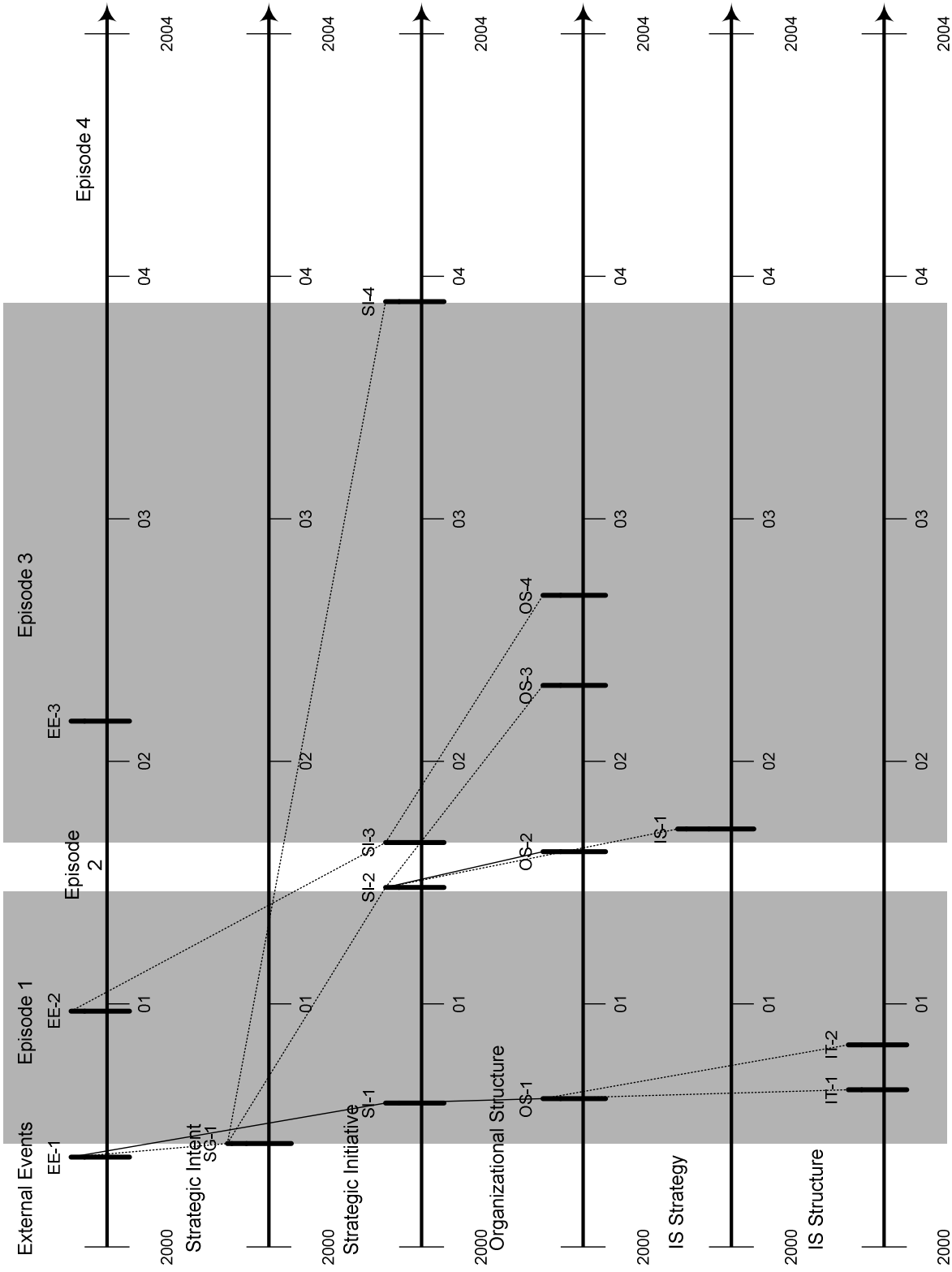

Figure 5-2: PartCo Timeline

5.1.2.1 Episode 1 –Merging Two Well-Established Manufacturers

Episode Summary -The merger was motivated by a changing economic environment that resulted in a trend away from vertical integration in the automotive industry. The divestiture of vertically integrated companies by the major OEMs left the industry fragmented and in need of consolidation among the lower tier suppliers. The merger allowed two moderate sized manufacturers to become one of the top 25 suppliers to the OEMs. The merger (EE-1) triggered the first episode at PartCo.

As a result of the merger, a new strategic goal was established for the merged company: to become the number one supplier to the OEMs (SG-1). This strategic goal did not lead to any strategic initiatives during the first alignment episode. Instead, the company implemented a strategic initiative to address the immediate needs of the merged company. The initial strategic initiative (SI-1) focused on eliminating redundancy in the structures and operations of the merged company to reduce costs.

The focus on consolidation resulted in changes to the organizational structure (OS-1) and to the IS structures (IT-1). Both change events were triggered partially by the need to reduce costs and partially by the logistics of the merger itself. The merger could not be effective with multiple structures for both the organization and IS and eliminating these duplicate structures reduced redundant costs. The need to focus on cost cutting and consolidating the companies did not provide an impetus to change the IS strategy. Instead, management consciously chose not to address the IS strategy at the time of the

merger, choosing instead, to wait for the company to stabilize before moving forward with an IS strategy.

Alignment Summary - Episode 1 exhibited decoupled changes with changes in three of the four internal alignment factors. The merger triggered changes in the strategic goals and in the strategic intent during the episode. The change to strategic initiative that occurred, however, was not related to the change in strategic intent. The changes in organizational structure and in IS structure were related to the strategic initiative, but not to the strategic goal. There was no change in IS strategy during this alignment period.

5.1.2.2 Episode 2 –Assembling Modules

Episode Summary -The second alignment episode was triggered by a strategic initiative to assemble modules (SI-2). High unionized wages were driving the major auto manufacturers to outsource not only part manufacturing, but more and more of the final assembly of automobiles. The purpose of the strategic initiative was to further the strategic goal of growth (SG-1) by capturing more of the OEM's assembly process and content per vehicle as the OEMs increased the amount of outsourcing. The strategic initiative triggered a change in the organizational structure with PartCo establishing plants for assembling the larger modules close to their customer's plants (OS-2). The size of the assembled modules made it difficult to transport them, requiring PartCo to locate close to the OEM's plants to reduce the complexity and cost of transporting the modules.

The strategic initiative to assemble modules and the need to consolidate multiple systems used throughout PartCo influenced the development of an IS strategy. The module assembly required that PartCo be able to coordinate the manufacture and delivery

of parts for assembly, requiring coordinated delivery of parts from third party vendors. The number of disparate systems in place due to the merger and evolution of the systems likewise influenced the need to consolidate and standardize the systems (IS-1). A more integrated IS system with standardized data would allow the easy flow of data across divisions and subunits of the organization and reduce cost associated with the numerous existing systems. Neither the strategic initiative, nor the IS consolidation strategy triggered immediate changes in the IS structure. Instead, PartCo chose a more evolutionary approach based on consolidating systems when they become obsolete and not replacing them for the sake of consolidation.

Alignment Summary - Episode 2 exhibited decoupled changes to the alignment factors with related changes to three of the four internal alignment factors. Consistent with the strategic goal of long-term growth, a new strategic initiative was implemented that led to changes in organizational structure and helped to form an IS strategy. There was, however, no change to the IS structure during this period.

5.1.2.3 Episode 3 – Meeting New Federal Emission Regulations

Episode Summary -The third episode at PartCo was triggered by new government regulations controlling motor emissions (EE-2). The new regulations provided an opportunity for PartCo to develop new products to help the OEMs meet the more stringent regulations. Management viewed this as a strategic opportunity and implemented a strategic initiative to innovate new products compliant with the impending regulations (SI-3).

The new strategic initiative triggered a change in the organizational structure. Prior to the new regulations, PartCo had engaged in a joint venture with a European company

that had a strong engineering department with experience in product development. This joint venture took on added strategic significance in light of the new government regulations because of the subsidiary's engineering expertise in an area that addressed the new government regulations. PartCo thus acquired the remaining interest in the joint venture (OS-3). No other changes were triggered by this change in strategic initiative or organizational structure. There were no changes in IS strategy or IS structure during this period.

Alignment Summary - PartCo's Episode 3 exhibited decoupled changes to the alignment factors. Changes external to PartCo brought about the change in strategic initiative which likewise triggered a change in the organizational structure. There were, however, no changes in IS strategy or structure related to the new strategic initiative.

5.1.2.4 Episode 4 – Attempting a Hostile Acquisition

Episode Summary -The fourth episode was triggered by the initial strategic goal of growth. One avenue for growth was through acquisition (SI-4) and PartCo attempted a hostile take-over of a larger company. The acquisition, if successful, would have made PartCo one of the largest suppliers to the automotive OEMs. The acquisition failed, however, and thus there was no change to the organizational structure or IS strategy or structure as a result of the strategic initiative. While episode 4 did not exhibit coupled changes in the alignment factors, the failure of the strategic initiative to acquire the target company likely altered the impact on the alignment pattern. There is no way to determine whether a successful merger would have triggered a tighter coupling among the alignment factors.

Alignment Summary - The attempted acquisition represented a change in strategic initiative and therefore, maintaining consistency across cases, was considered a trigger for new episodes. The acquisition failed, however, and no other changes occurred during this alignment episode. Episode 4, therefore, exhibited decoupled changes in the alignment factors.

Episode #	Pattern of Alignment
1	(3/4) Decoupled
2	(3/4) Decoupled
3	(2/4) Decoupled
4	(0/4) Decoupled

Table 5-5: Summary of PartCo Alignment Patterns by Episode

5.1.3 MotorCo

MotorCo is a division of a Fortune 500 company that manufactures electric motors for a variety of applications in the industrial, commercial, and consumer markets. The parent company is a publicly-held, multi-billion dollar firm listed on the New York Stock Exchange. MotorCo represents one of five major divisions of the parent conglomerate. MotorCo division has a global presence employing over 100,000 people in 245 plants with a presence in 150 countries. MotorCo has a formal IS strategy and IS planning process making them an appropriate research site.

Data for MotorCo covers a ten-year period from 1995 to 2004. There were three alignment episodes at PartCo during the period from 1995 to 2004 representing 28 change events in the alignment factors (See Table 5-6 and Figure 5-3).

"Alignment Factor"	Episode 1 – Initiating an eBusiness Strategy		
	Date Initiated	**Description**	**Trigger**
External Environment	1996	Proliferation of the Internet (EE-1)	Technological Innovation
	1998	Concerns over Y2K (EE-3)	
Strategic Intent (Goals)		No Change	
Strategic Initiatives	Prior to 1995	Continuing Best Cost strategy (SI-1)	
	1997	Initiating an eBusiness Strategy (SI-2)	Proliferation of the Internet (EE-1)
Organization Structure	1997	Shifting Manufacturing Plants to Mexico (OS-1)	Continuing Best Cost Strategy (SI-1)
IS Strategy	1998	Focusing on Y2K compliance (IS-1)	Concerns over Y2K(EE-3)
IS Structure		No Change	

Table 5-6a: Summary of MotorCo Alignment Episodes

"Alignment Factor"	Episode 2 – Focusing on The End Customer		
	Date Initiated	**Description**	**Trigger**
External Environment	1997	Shifting Corporate Level Strategic Initiatives (EE-2)	Slowing Growth and Customer Feedback
	1998	Developing Corporate-Wide Procurement System and Stated Strategic Importance of IS (EE-4)	
	1999	Reorganizing Corporate Business Segments (EE-5)	
	2000	Establishing Corporate-wide Shared Internet Connectivity (EE-6)	
Strategic Intent (Goals)		No Change	
Strategic Initiatives	2000	Focusing on End Customer (SI-3)	Shifting Corporate Level Initiatives (EE-2)
Organization Structure	2000	Creating the Commercial Industrial Motors Division (CIM) (OS-2)	Shift in Corporate Level Initiatives and Focus on End Customer (EE-2 and SI-3)
	2000	Off-Shoring of Manufacturing (OS-3)	Continuing Best Cost Strategy (SI-1)
	2000	Establishing the eBusiness Group (OS-4)	Initiating an eBusiness Strategy (SI-2)
IS Strategy		No Change	
IS Structure		No Change	

Table 5-6b: Summary of MotorCo Alignment Episodes

"Alignment Factor"	Episode 3 – Reducing SG&A Costs		
	Date Initiated	**Description**	**Trigger**
External Environment	2000	Crash in Technology Market and Recession in U.S. Economy (EE-7)	
	2000	Increasing Foreign Competition (EE-8)	
	2001	Creating a Corporate-wide IT Shared Services (EE-9)	
	2001	Adopting of Oracle as Corporate-wide Enterprise Application (EE-10)	
	2002	Responding to Business Scandal Legislation (Sarbanes Oxley Act) (EE-11)	
	2002	Inflation in Raw Material Prices (EE-12)	
Strategic Intent (Goals)	2000	Shifting Business Unit Level Strategic Goal from Growth to Profitability (SG-1)	Crash in Technology Market and Recession in U.S. Economy (EE-7) and Increasing Foreign Competition (EE-8)
Strategic Initiatives	2001	Reducing SG&A Costs(SI-4)	Shift in Business Unit Level Strategic Goal from Growth to Profitability (SG-1)
Organization Structure	2001	Outsourcing SG&A Tasks (OS-5)	Shift in Business Unit Level Strategic Goal from Growth to Profitability. Reduction in SG&A (SG-1 and SI-4)
	2003	Reorganizing CIM into Four Business Units (OS-6)	Consistent with Corporate Level Initiatives (EE-2 and EE-5)
IS Strategy	2001	Centralizing/Leveraging Corporate-wide IS resources (IS-2)	Stated Strategic Importance of IS and Development of Corporate-Wide Procurement System (EE-4) and Creation of Corporate-wide IT Shared Services (EE-9)
IS Structure	2001	Formatting IT Shared Services (IT-1)	Creation of Corporate-wide IT Shared Services (EE-9) and Centralization/ Leveraging Corporate-wide IS resources (IS-2)
	2001	Initiating Implementation of Oracle as Motor Company's Standard Enterprise Application (IT-2)	Move to Corporate-Wide IT Shared Services and Selection of Oracle (EE-9 and EE-10)
	2002	Increasing IT Security and Compliance with Sarbanes Oxley Act (IT-3)	Business Scandals and Sarbanes Oxley Act (EE-11)

Table 5-6c: Summary of MotorCo Alignment Episodes

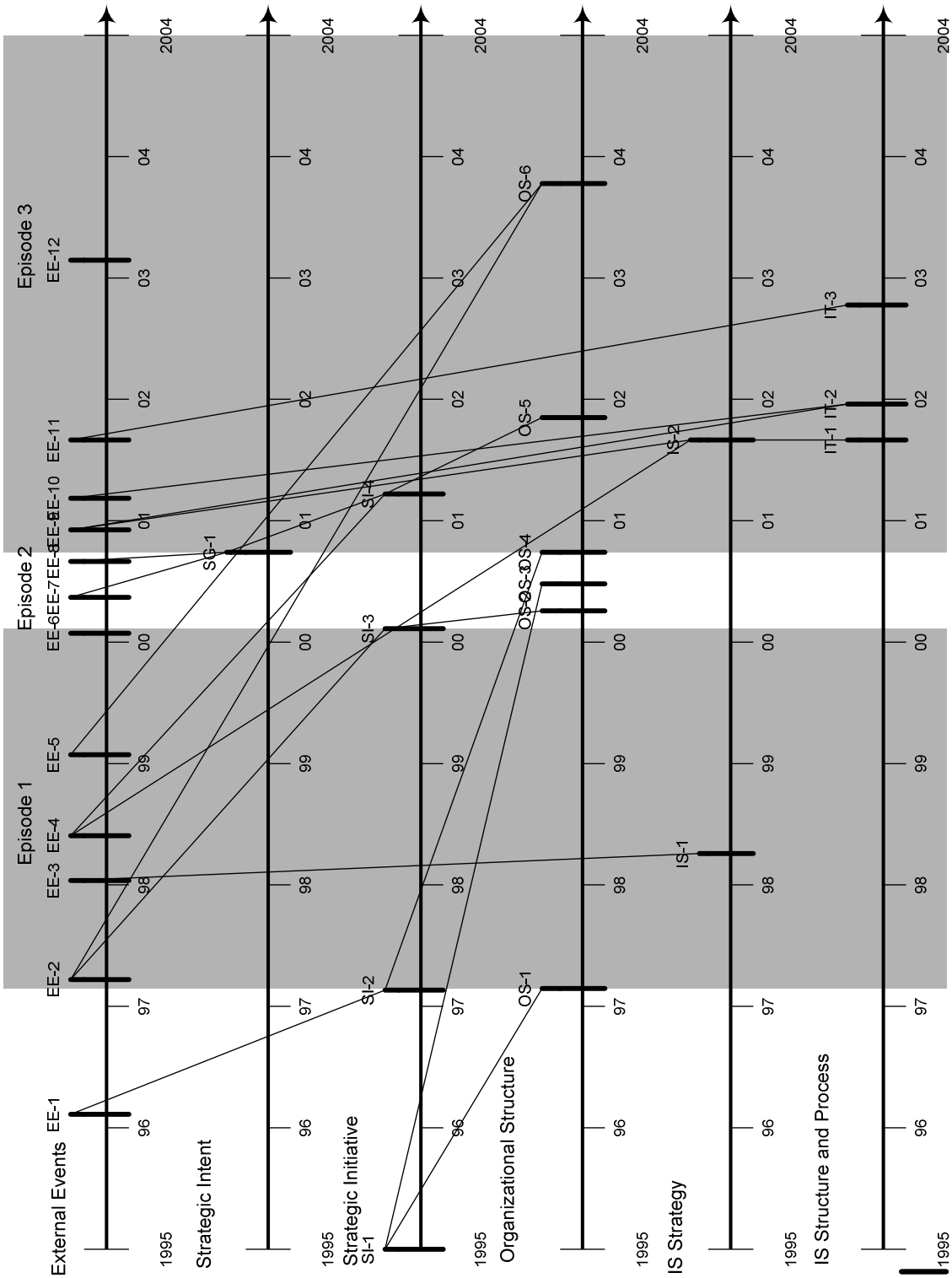

Figure 5-3: MotorCo Timeline

5.1.3.1 Prior to First Episode - Continuing Record Setting Performance

There were four periods but only three alignment episodes at MotorCo from 1995 to 2004, the period covered by this research. The first two years of the ten-year period can best be described as a period of continuing record-setting performance. The company was following a "best cost" strategy first implemented in 1983 that was based on a focused differentiation based on product quality and price (SI-1). However, there was no change in either strategic goals or strategic intent to trigger a complete alignment episode.

5.1.3.2 Episode 1 – Initiating an eBusiness Strategy

Episode Summary -Episode 1, which represented the first complete episode for observing alignment, occurred during 1997 when technological advancements established the internet as a business tool (EE-1). To respond to the business potential of the internet, MotorCo established a strategic initiative to develop an ebusiness strategy (SI-2). There was no change in organizational structure during this episode resulting from this strategic initiative because the primary focus was on strategy development. Nor were there changes in IS strategy or IS structure triggered by the ebusiness strategic initiative during this alignment episode.

There was, however, a change in organizational structure unrelated to the ebusiness strategic initiative. During this episode, MotorCo shifted manufacturing from the U.S. to facilities in Mexico. The shift was designed to leverage lower manufacturing costs in Mexico and was considered an additional step in maintaining the best cost strategy. The change in organizational structure was linked to the existing strategic initiative (SI-1) and not the strategic trigger for Episode 1.

There was also a change in IS strategy during this alignment episode triggered by Y2K (EE-3). The threat of systems failure led MotorCo to focus on Y2K compliance (IS-1). No business strategy or organizational structure changes drive the change in IS strategy, and the IS strategy did not impact any other alignment factor. Nor were any significant changes to the IS structure brought about by the IS strategy. In fact, it was noted that potential changes to the IS structure were delayed until after Y2K.

Alignment Summary - Episode 1 exhibited decoupled changes to the alignment factors. The strategic initiative (SI-2) that triggered the alignment episode did not result in any changes to other alignment factors during the time period covered by the alignment period. No changes in IS strategy or IS structure occurred as a result of either the change in strategic intent or change in organizational structure. A change to organizational structure occurred that was linked to a prior strategic initiative; but no other related changes in IS strategy or structure resulted from it. A change to IS strategy occurred, but in direct response to external events, not the change in strategic initiative or organizational structure. The new IS strategy did not trigger any other changes in the organization.

5.1.3.3 Episode 2– Focusing on the End Customer

Episode Summary –Episode 2 was triggered by a change in strategic initiative to focus on the end-customer (SI-3). This end-customer focus was driven by strategic changes at the parent company level (EE-2). The parent company was concerned about customers' perceptions of the difficulty in doing business across the multiple businesses units and was concerned that the autonomy of the units resulted in not capitalizing on cross-selling opportunities.

The focus on the end-customer led to structural consolidation at MotorCo (OS-2). This consolidation focused on reorganizing subunits of MotorCo by grouping them around markets. These changes did not trigger any changes in IS strategy or IS structure.

An additional change to the organizational structure also occurred during this time period as MotorCo moved production off-shore (OS-3). This change was related to the best cost strategy implemented in 1983, prior to the beginning of the research (SI-1). MotorCo shifted manufacturing from the U.S. to Asian and other emerging markets to leverage their lower cost structures, similar to the move to Mexico in the prior episode. This change in organizational structure did not impact the other alignment factors.

Alignment Summary - Episode 2 exhibited decoupled changes among the alignment factor change events. An external event (EE-2) triggered the change in strategic initiative (SI-3), which likewise resulted in a corresponding change to the organizational structure (OS-2). There were, however, no further changes to the other alignment factors. A second change to the organizational structure (OS-3) related to a strategic initiative (SI-2) from a prior period occurred during this alignment episode and was decoupled from the strategic initiative that triggered the alignment episode.

5.1.3.4 Episode 3 – Reducing Selling, General &Administrative Costs

Episode Summary – Episode 3 was triggered by a change in strategic goals and was characterized by a competitive environment and numerous changes in the alignment factors. The technology crash and U.S. recession (EE-7) during 2001 compounded by increased competition from foreign manufacturers (EE-8) created a difficult marketplace for MotorCo. MotorCo reacted by shifting from a growth strategy with a secondary focus on cost to a focus on cost cutting with a secondary focus on growth (SG-1). The

shift in strategic goals combined with the impact of the existing best cost strategy, led to a strategic initiative to focus on cutting selling, general, and administrative (SG&A) costs (SI-4). This initiative triggered a change to the organizational structure with SG&A costs being outsourced (OS-5) to China and India. The changes to strategy and organizational structure, however, did not trigger any changes to the IS strategy or IS structure.

Although unrelated to the changes in strategy and organizational structure, the IS strategy did change during this episode. Prior to this point, there was little strategic value placed on IS at MotorCo until a corporate level strategic focus on IS (EE-4) and implementation of a corporate-wide IT shared services architecture (EE-9) led MotorCo to focus on centralization and leveraging IS corporate-wide resources (IS-2). This new IS strategy triggered a change in IS structure resulting in IS functions being shifted from MotorCo to the corporate level. The changes in IS strategy and structure did not result in changes to any other alignment factor.

During this same episode, an additional restructuring of MotorCo occurred (OS-6) resulting from the continued focus on the end-customer (EE-2) at the corporate level. Corporate reorganized the corporate structure (EE-5) to better target customers with a basket of goods and services. The restructuring of MotorCo did not lead to any changes in MotorCo's business strategy or in its IS strategy or structure, but internally MotorCo did reorganize to group units by product lines.

Independent of other changes during this same time frame, the Enron and WorldCom business scandals resulted in new regulation, the Sarbanes Oxley Act (EE-11). Sarbanes Oxley implemented new standards for information assurance and auditing that required structural changes to MotorCo's information systems (IT-3). The changes triggered by

Sarbanes Oxley were isolated to IT structure and processes and did not impact the other internal alignment factors.

Alignment Summary – Episode 3 exhibited decoupled changes in the internal alignment factors. External environmental changes influenced a shift in strategic goals (SG-1), which triggered a change in strategic initiatives (SI-4). This change in strategic initiative triggered organizational structural changes (OS-5). There was an additional change in organizational structure during this period, which was decoupled from the shifts in strategy. Instead, it was due to the prior external, corporate level events (EE-2, EE-5).

No changes to IS strategy or structure directly related to the shift in strategic intent. There was a shift in IS strategy (IS-2) driven by corporate level changes (EE-9) that resulted in changes to MotorCo's external environment. This change in IS strategy and the corporate level change also triggered a change in IT structure (IT-1). Two additional changes to IS structure (IT-2, IT-3) occurred that were decoupled from the other changes to the internal alignment factors, which were attributed directly to changes in the environment (EE-9, EE-10, EE-11).

Episode #	Pattern of Alignment
1	(1/4) Decoupled
2	(2/4) Decoupled
3	(1/4) Decoupled

Table 5-7: Summary of MotorCo Alignment Patterns by Episode

5.2 Phase I Results

Recall that Phase I addresses the research question (RQ1): How does the organization's contextual setting impact the pattern of change in the internal alignment factors? This research question was addressed via two propositions; the first proposition

addressing the size of the firm, and the second proposition addressing the formality of the IS strategy. First the detailed results of Proposition 1 and its corresponding Hypotheses 1a and 1b are presented, followed by the results of Proposition 2 and its Hypotheses 2a and 2b, and Hypotheses 3a and 3b.

5.2.1 Proposition 1 – Firm Size

Proposition 1 focuses on the impact of firm size on the pattern of alignment, suggesting that the existence of decoupled patterns of alignment are independent of firm size. Both PartCo and MotorCo have revenues in excess of $1 billion annually (see Table 5-8). By definition, therefore, both PlumbCo and PartCo qualify as larger corporations making them appropriate for evaluation of Proposition 1. Thus the data from these two large firms are the focus of Proposition 1.

Case Site	Annual Revenues[7]
PlumbCo	$450
PartCo	$8,000
MotorCo	$3,500

Table 5-8: Size in Annual Revenues by Case Site

Hypothesis 1a, consistent with the traditional view of alignment as synchronization, predicts a synchronized pattern of alignment for large firms, while the rival Hypothesis, 1b, consistent with TAGA, predicts a decoupled pattern of alignment.

The traditional pattern of alignment as synchronization assumes a vertical or stair-stepped alignment process that connects all four traditional internal alignment factors (see Figure 4-1). Traditional alignment, viewed as synchronization, implies that when there is

[7] Revenues are estimates and stated in millions of dollars. Estimate for MotorCo represents the division.

a change in one alignment factor there will be related changes in the other internal alignment factors in order to align the IS with the business. TAGA, alternatively, predicts decoupled changes with only limited relationships to the other internal alignment factors.

Examination of Figure 5-3 and Table 5-9a indicate that there were 4 alignment episodes comprised of 15 change events at PartCo. Based on the number of potential binary relationships between the four alignment factors involved in Henderson and Venkatraman's (1993) model as well as strategic intent, there are 10 potential relationships per episode. Therefore, the four alignment episodes observed at PartCo could potentially result in a total of 40 relationships. Only 8 such relationships were observed, however (see Table 5-9a). Further, examination of Figure 5-3 indicates that none of the episodes at PartCo exhibited a vertical or stair step alignment process. All three episodes from PartCo exhibited decoupled patterns among the four internal alignment factors.

At MotorCo, the results were similar. Out of the three alignment episodes, with 30 potential binary relationships, only seven relationships were actually observed (see Table 5-9b). None of the alignment episodes exhibited either a vertical or stair step pattern of change (see Figure 5-3). All of the alignment episodes identified at MotorCo exhibited decoupled alignment patterns with two or fewer relationships among the four alignment factors.

Episode	Potential Event Relationships[8]	#	Actual Event Relationships	#
1	SG-A→SI-A; SG-A→OS-A; SG-A→IS-A; SG-A→IT-A; SI-A→OS-A; SI-A→IS-A; SI-A→IT-A; OS-A→IS-A; OS-A→IT-A; IS-A→IT-A	10	SI-1→OS-1→IT-1 OS-1→IT-2	3
2	SG-B→SI-B; SG-B→OS-B; SG-B→IS-B; SG-B→IT-B; SI-B→OS-B; SI-B→IS-B; SI-B→IT-B; OS-B→IS-B; OS-B→IT-B; IS-B→IT-B	10	SG-1→SI-2→ OS-2 SI-2→IS-1 SI-2→OS-3	4
3	SG-C→SI-C; SG-C→OS-C; SG-C→IS-C; SG-C→ IT-C; SI-C→OS-C; SI-C→IS-C; SI-C→IT-C; OS-C→IS-C; OS-C→IT-C ; IS-C→IT-C	10	SI-3 →OS-4	1
4	SG-D→ SI-D; SG-D→ OS-D; SG-D→ IS-D; SG-D→ IT-D; SI-D→OS-D; SI-D → IS-D; SI-D → IT-D; OS-D→IS-D; OS-D → IT-D; IS-D→IT-D	10		0
# Links		**40**		**8**

Table 5-9a: Inter-Related Changes in PartCo Alignment Episodes

Episode	Potential Event Relationships	#	Actual Event Relationships	#
1	SG-B→SI-B; SG-B→OS-B; SG-B→IS-B; SG-B→IT-B; SI-B→OS-B; SI-B→IS-B; SI-B→IT-B; OS-B→IS-B; OS-B→IT-B; IS-B→IT-B	10	SI-1→ OS-1 SI-1→ OS-3 SI-2 →OS-4	3
2	SG-C→SI-C; SG-C→OS-C; SG-C→IS-C; SG-C→ IT-C; SI-C→OS-C; SI-C→IS-C; SI-C→IT-C; OS-C→IS-C; OS-C→IT-C ; IS-C→IT-C	10	SI-3 → OS-2	1
3	SG-D→ SI-D; SG-D→ OS-D; SG-D→ IS-D; SG-D→ IT-D; SI-D→OS-D; SI-D → IS-D; SI-D → IT-D; OS-D→IS-D; OS-D → IT-D; IS-D→IT-D	10	SG-1 →SI-4 → OS-5 IS-2 →IT-1	3
# Links		**30**		7

Table 5-9b: Inter-Related Changes in MotorCo Alignment Episodes

[8] We simply state factors involved in Henderson and Venkatraman's model as well as strategic intent and acknowledge that there are ten binary relationships.

The results from the case studies thus support Proposition 1. Although there were episodes with identifiable relationships connecting alignment factor change events in the two larger firms, none of the alignment episodes exhibited coupled changes to all four of the alignment factors, the pattern consistent with alignment as synchronization. The decoupling of change events among the internal alignment factors during episodes is consistent with the theoretically-derived pattern from TAGA, the theory of alignment as guided adaptation. The results of PartCo and MotorCo, therefore, support Hypothesis 1b and provide evidence that disconfirms Hypothesis 1a. The results indicate that TAGA generalizes to larger firms and is more explanatory than alignment as synchronization in this context, as indicated by Proposition 1 and Hypothesis 1b.

5.2.2 Proposition 2 – Formality of IS Strategy

Proposition 2 focuses on the impact of the formality of IS strategy on the alignment pattern (i.e., decoupled patterns of alignment will occur independent of the formality of the IS strategy). As with Proposition 1, rival hypotheses were used to compare the traditional theory of alignment as synchronization and TAGA. Two sets of competing hypotheses were developed to address Proposition 2, with Hypotheses 2a and 2b addressing the formality of the IS planning process and Hypotheses 3a and 3b addressing the formality of the IS strategy.

As addressed in Chapter 4, a survey instrument was adapted from Segar and Grover's Formal IS Planning Instrument to determine the formality of IS planning and of IS strategy at the case sites. All three firms were considered to have a formal IS strategy and a formal IS planning process by those interviewed (see Table 5-10), making all three cases suitable for addressing Proposition 2.

Case Site	Responses to IS Planning (Yes/#Responses/#Interviewed)	Responses to IS Strategy (Yes/#Responses/#Interviewed)
PlumbCo	9/9/10	7/9/10
PartCo	9/10/10	10/10/10
MotorCo	10/11/11	10/11/11

Table 5-10: Responses to Formal IS Planning and IS Strategy

In addition to responding to the question, the interviewees were asked to evaluate the degree of formality of both IS planning and IS strategy based on a 7-point Lickert type scale with 1 being low and 7 high. The average responses indicated that all three cases exhibited moderate levels of formal IS planning and IS strategy (see Table 5-11),[9] again indicating that all three case sites were appropriate sites for evaluation of Proposition 2.

Case Site	IS Planning Rating (7 Point Scale) (1=Low, 7=High)	IS Strategy Rating (7 Point Scale) (1=Low, 7=High)
PlumbCo	4.38	4.18
PartCo	5.11	5.2
MotorCo	4.65	4.3

Table 5-11: Formality of IS Planning and of IS Strategy

Examination of Figure 5-1 and Table 5-12 indicate that, at PlumbCo, there are five alignment episodes comprised of 26 change events. Among the five alignment episodes, there are a total of 50 potential relationships. Only 15 relationships were observed (see Table 5-12).

Only one of the five alignment episodes at PlumbCo exhibited an alignment pattern similar to that predicted by alignment as synchronization (Episode 1). In this episode, the firm, reacting to a changing industry structure, implemented a long-range strategic plan that called for the use of an IS infrastructure to enable the company to compete. Changes in all of the internal alignment factors resulted in the pattern predicted by alignment as

[9] For all three cases, the number of interviewees was too small to perform statistical analysis.

synchronization. All of the remaining four alignment episodes exhibited decoupled patterns of alignment.

The data for PartCo and MotorCo were presented in testing Proposition 1. Recall that at PartCo, four alignment episodes were observed, with all four alignment episodes exhibiting decoupled patterns of alignment. All three of MotorCo's alignment episodes exhibited decoupled patterns of alignment as well. See Section 5.2.1 for additional detail.

Episode	Potential Event Relationships	#	Actual Event Relationships	#
1	SG-A→SI-A; SG-A→OS-A; SG-A→IS-A; SG-A→IT-A; SI-A→OS-A; SI-A→IS-A; SI-A→IT-A; OS-A→IS-A; OS-A→IT-A; IS-A→IT-A	10	SG-1→ SI-1→ OS-1 SI-1→OS-2 SI-1→IS-1 SI-1→IT-1	5
2	SG-B→SI-B; SG-B→OS-B; SG-B→IS-B; SG-B→IT-B; SI-B→OS-B; SI-B→IS-B; SI-B→IT-B; OS-B→IS-B; OS-B→IT-B; IS-B→IT-B	10		0
3	SG-C→SI-C; SG-C→OS-C; SG-C→IS-C; SG-C→ IT-C; SI-C→OS-C; SI-C→IS-C; SI-C→IT-C; OS-C→IS-C; OS-C→IT-C ; IS-C→IT-C	10	IT-2→SI-3 IS-1→IT-3 IS-1→IT-4	3
4	SG-D→ SI-D; SG-D→ OS-D; SG-D→ IS-D; SG-D→ IT-D; SI-D→OS-D; SI-D → IS-D; SI-D → IT-D; OS-D→IS-D; OS-D → IT-D; IS-D→IT-D	10	SI-4→IT-5 SI-4→OS-3→IT-6 IT-5→OS-3	4
5	SI-E→OS-E; SI-E → IS-E; SI-E → IT -E; OS-E→IS-E; OS-E → IT -E; IS-E→ IT -E	10	SG-2→ SI-5 SG-2→IS-2→IT-7	3
# Links		**50**		**15**

Table 5-12: Inter-Related Changes in PlumbCo Alignment Episodes

In summary, then, the majority (11 out of 12) of the episodes exhibited relationships among the alignment factors that were decoupled. The conclusion, based on a preponderance of the evidence, is that firms with formal IS planning and IS strategy display similar patterns of alignment to firms with informal or non-strategic approaches

to IS (see Ward and Vessey, working paper). These findings support Hypotheses 2b and 3b and provide disconfirming evidence of Hypotheses 2a and 3a. Thus, alignment as synchronization is not evident in firms with a formal approach to IS strategy, providing support for TAGA in generalizing to these additional contextual settings. The results of the case study support Proposition 2 that the alignment factors change independent of the firm's strategic view of IS.

5.3 Phase II Results

Recall that Phase II addresses the research question: what characteristics of change in the outer environment impact the adaptation of an internal alignment factor? The research question is addressed by four propositions. Chapter 3 proposed that three dimensions of change (level, magnitude, and pace) influence the need for an alignment factor to alter its internal structure. The first three propositions evaluate the relationship between the dimension and the likelihood of change in the alignment factors. A fourth proposition considers the cumulative effect of the three dimensions to determine how the dynamism of the environment impacts an internal alignment factor's need to alter its internal structure. First the results for Propositions 3, 4, and 5 are presented as individual dimensions of change. Then Proposition 6 is presented to consider the cumulative impact of the three dimensions of change.

Recall that Phase I examined the impact of firm size and formality of IS strategy as the independent variables on the pattern of relationships among the internal alignment factors as the dependent variable. Events that occurred in the external environment do not, therefore, form part of the dependent variable for the Phase I propositions. Phase II, on the other hand, focuses on the impact of external changes on the internal alignment

factors. Thus for Phase II, the external events form part of the independent variable and are therefore included in the analysis of the propositions.

5.3.1 Proposition 3 – Level of Change (Hierarchy)

Proposition 3 addresses the impact of the level at which the initiating change occurs on the internal alignment factors. Specifically, Proposition 3 states that the higher the level in the alignment hierarchy at which the initiating change occurs, the greater the likelihood that the internal structure of an alignment factor will require change. An initiating change event is one that serves as a trigger for inducing change in one or more additional alignment factors. Consistent with the chain of evidence (Appendix B), each initiating change trigger was examined to determine whether the level of the initiating event influenced the likelihood of change in factors at a lower level in the alignment hierarchy.

In analyzing Proposition 3, the dependent variable is the number of related changes in the levels resulting from the initiating change event. Tables 5-13 a, b, and c present the number of related changes by initiating trigger for each case site. Following data collection, it became apparent that multiple triggers impacted multiple alignment episodes resulting in two confounding issues in analyzing Proposition 3. The first issue is that certain dependent variables were triggered by multiple initiating events. For example, the first alignment episode of PlumbCo was triggered by two initiating external events (EE-1 & EE-2). Second, certain initiating change events triggered multiple alignment episodes. Again, using EE-1 and EE-2 from PlumbCo as an example, EE-1 and EE-2 triggered the initial change in strategic intent and strategic initiative (SG-1 and SI-1) that triggered alignment Episode 1. EE-1 and EE-2 were also the triggered SI-2,

which ushered in the second alignment episode. Because these confounding influences could potentially result in double counting initiating events or double counting subsequent events, depending on the approach taken, the decision was made to eliminate the duplicate counting for both the independent and dependent variables. The double counting of the triggering events was eliminated by counting only the initiating events that had not been included in prior episode analysis in the count of the independent variable. This approach eliminated triggers counted in the prior episodes and therefore counted only the most recent triggers. Focusing on the alignment episodes as displayed in Tables 5-3 a, b, and c as opposed to mapping out the alignment path for each initiating event, eliminated the potential for double counting the events in the dependent variable.

The results indicate that the majority of initiating triggers were environmental factors. Within PlumbCo, there were eight initiating events (EE-1, EE-2, EE-3, EE-4, EE-5, EE-6, SI-4, IT-2), of which six occurred in the external environment, one occurred at the strategic initiative level, and one occurred at the IS structure level (see Table 5-13a).

Note, however, that coevolutionary forces among the alignment factors as individual systems creates a situation where the hierarchical effect is probabilistic and not causal and that lower-level changes can trigger higher-level changes in the internal alignment factors. And while we define an alignment episode as being demarcated by a change in business strategy (either intent or initiative), a strategic initiative can be triggered by a lower level change as is exemplified by the relationship between IT-2 and SI-3 at PlumbCo. A change in a lower-level alignment factor can trigger a change in a higher-level alignment factor in the same way that a higher-level alignment factor can trigger a change in a lower-level alignment factor; it changes the outer environment of the higher-

level alignment factor, and hence has the potential to bring about change in any of the alignment factors. For example, implementing and ERP system, which represents a change in the IS structure, can trigger changes in the organizational structure (see also Chapter 2, section 2.2.2 for additional explanation).

Initiating Level	Related Changes by Initiating Change Triggers (Path)	Number of Resultant Changes
EE	**EE-1& EE-2**→SG-1→SI-1→ OS-1 & OS-2 & IS-1 & IT-1 & IT-2 & IT-3 & IT-4	9
EE	EE-1, EE-2, **EE-3, & EE-4**→ SI-2	1
IT	**IT-2**→SI-3	1
SI	**SI-4**→IT-5→OS-3→IT-6	3
EE	**EE-5, EE-6**, →SG-2→SI-5 & IS-2→IT-7	4
	Total Related Changes	18

Table 5-13a: Number of PlumbCo Related Changes by Initiating Change Trigger(s)

PartCo had two initiating change events (EE-1, EE-2), both occurring in the external environment (see Table 5.13b).

Initiating Level	Related Changes by Initiating Triggers (Path)	Number of Resultant Changes
EE	**EE-1**→ SG-1→SI-2 & SI-4→ OS-2 & OS-3→IS-1	6
EE	EE-1→ SI-1→ OS-1→ IT-1 & IT-2	4
EE	**EE-2**→ SI-3→OS-4	2
	Total Related Changes	12

Table 5-13b: Number of PartCo Related Changes by Initiating Change Trigger(s)

MotorCo had 11 initiating changes (EE-1, EE-2, EE-3, EE-4, EE-5, EE-7, EE-8, EE-9, EE-10, EE-11, SI-1) of which 10 occurred in the external environment and one at the strategic initiative level (see Table 5.13c).

Initiating Level	Related Changes by Initiating Triggers (Path)	Number of Resultant Changes
SI	**SI-1→** OS-1 & OS-3	2
EE	**EE-1→**SI-2→OS-4	2
EE	**EE-2→**SI-3→OS-2	2
EE	EE-2&**EE-5→**OS-6	1
EE	**EE-3→** IS-1	1
EE	**EE-4&EE9→**IS-2→IT-1	2
EE	EE-4&**EE-7&EE-8→** SG-1→SI-4→OS-5	1
EE	EE-9, **EE-10→** IT-2	1
EE	**EE-11→** IT-3	1
	Total Related Changes	13

Table 5-13c: Number of MotorCo Related Changes by Initiating Change Trigger(s)

Aggregated across the cases, there were a total of 21 initiating events that triggered a total of 42 lower-level change events and one higher-level change event. The 18 external environment events initiated 37 of the lower-level change events in the alignment factors. The two initiating change events at the strategic initiative level resulted in five lower-level changes. No changes were initiated at the strategic intent (SG), organizational structure (OS), or IS strategy (IS) levels. One change was initiated at the IT level resulting in one upper-level change and no lower-level changes.

Level of Initiating Change	Initiating Changes Per Level	Total Related Changes
EE	18	37
SG	0	0
SI	2	5
OS	0	0
IS	0	0
IT	1	1

Table 5-14: Total Number of Related Changes Per Initiating Level

The majority of changes in alignment factors were initiated by changes in the external environment, the highest level in the TAGA alignment model. The conclusion, based on a preponderance of the evidence, is that the level of initiating change does impact the likelihood of change in the alignment factors. Specifically, the higher the initiating change, the more likely lower-level alignment factors will need to alter their internal structure. The results support Proposition 3.

5.3.2 Proposition 4 – Magnitude of Initiating Change

Proposition 4 addresses the magnitude of the initiating change and its impact on the internal alignment factors. Specifically, Proposition 4 states that the greater the magnitude of change in the outer environment, the greater the likelihood that the internal structure of an alignment factor will need to be altered. Magnitude was determined by asking interviewees, via a follow-up survey, to rank the magnitude of each event as high, medium, or low. Consistent with prior measures (Huff & Huff 1995; Huff et al. 1992) the interviewees were asked to consider both the stress the company was under as a result of the change event and the resistance to the change. Table 5-15 displays the results by case site.

Case / Magnitude	Number of Events	Number of Related Events
PlumbCo		
High	5	20
Medium	0	0
Low	4	8
PartCo		
High	1	9
Medium	1	2
Low	0	0
MotorCo		
High	2	4
Medium	9	20
Low	0	0

Table 5-15: Number of Related Changes by Magnitude of Change Trigger

At PlumbCo, the five high magnitude events resulted in 20 lower-level changes; there were no medium magnitude events; low magnitude events resulted in eight lower-level changes. PartCo had one high magnitude change that resulted in nine lower level changes and one medium magnitude event that triggered two lower level events. There were no low magnitude events at PartCo. MotorCo had two high magnitude change events that triggered four lower level events and nine medium magnitude events that resulted in 20 lower level events.

Aggregating the results over the three cases as shown in Table 5-16, indicates that initiating events ranked as high in magnitude were related, on average, to more than four alignment factor change events. Events ranked as having a medium impact on the firm resulted, on average, in more than two related changes, while initiating events ranked as low in magnitude resulted in an average of two related changes. Hence the analysis of magnitude based on the average number of changes related to the different magnitudes of the change events supports Proposition 4.

Magnitude/Case	Number of Events	Number of Related Events	Average Number of Events
High			
PlumbCo	5	20	4
PartCo	1	9	9
MotorCo	2	4	2
Total	**8**	**33**	**4.125**
Medium			
PlumbCo	0	0	0
PartCo	1	2	2
MotorCo	9	20	2.22
Total	**10**	**22**	**2.2**
Low			
PlumbCo	4	8	2
PartCo	0	0	0
MotorCo	0	0	0
Total	**4**	**8**	**2**

Table 5-16: Cross-Case Analysis – Number of Related Changes by Magnitude of Change Trigger

5.3.3 Proposition 5 – Pace of Change (Frequency)

Proposition 5 addresses the pace of change in the outer environment and its impact on the internal alignment factors. Specifically, Proposition 5 states that the greater the pace of change in the outer environment, the greater the likelihood that the internal structure of an alignment factor will need to be altered. As noted in Section 3.2.3.3, pace represents rate of change. Because TAGA is a process-oriented theory, it is appropriate to address change over time.

As described in the chain of evidence (see Appendix B), Proposition 5 is analyzed as the ratio of alignment factor change events per alignment episode. TAGA suggests that if there are multiple changes in one alignment factor during an episode, there are likely to be multiple changes in the other alignment factors because changes in one factor results in changes in the outer environment of the other alignment factors. Multiple changes in

the outer environments of the other alignment factors increases the likelihood that the internal structures of the alignment factors will no longer be adapted to their environment. Thus the greater the number of change events in one alignment factor, the more likely there will be a corresponding increase in the number of changes in the other internal alignment factors during this same period of time (episode).

The number of change events per alignment factor per episode can be compared to determine whether there is evidence of this relationship, creating, in essence, a set of comparative ratios among the number of changes for each alignment factor during an alignment episode (e.g., EE:SG:SI:OS:IS:IT). For example, during Episode 1 at PartCo, there were two changes in the environment (EE-1 and EE-2), one change in the strategic intent (SG-1), one change in strategic initiative (SI-1), one change in the organizational structure (OS-1), no change in IS strategy, and two changes in the IS structure (IT-1) (see Table 5-17, Figure 5-2, and Section 5-1.2 for additional details). The resulting comparative ratio of alignment factor change events in hierarchical sequence (EE:SG:SI:OS:IS:IT), is thus 2:1:1:1:0:2.

Table 5.17 presents the number of changes per alignment factor per episode for each company. Table 5-17 can be traced back to Figures 5-1, 5-2, and 5-3 and the company totals can be traced back to the respective alignment factor in Table 5-1. Table 5-18 then presents this information in a comparative ratio format.

As described in the chain of evidence, the set of comparative ratios for each episode were examined for consistent patterns. A consistent pattern can represent a consistently high rate of change across the different levels of alignment factors, such as 7:7:7:7:7:7 or 6:5:7:6:5:5. Such a pattern is supportive of Proposition 5. Alternatively, a consistently

low rate of change across the different levels of alignment factors, for example, 1:1:1:1:1:1 or 1:2:1:1:1:2, also represents a consistent rate of change across the alignment factors and likewise supports Proposition 5. Patterns across episodes that represent numerous changes in one alignment factor without a similar number of changes in the other alignment factors such as 8:0:0:0:1:0 or 1:0:0:1:7:1 do not support P5 because this pattern indicates that the pace of change in one alignment factor did not result in increases in similar changes in the other alignment factors. Based upon this standard, the set of comparative ratios presented above for Episode 1 of PartCo (2:1:1:1:0:2) would be considered to support Proposition 5 because the changes among the alignment factors are consistent during Episode 1.

The determination of a "consistent ratio" requires discretion on the part of the researcher, that is, any cutoff point presents a subjective dichotomy. The ratios are presented in Table 5-18, and described below. The reader can examine the ratios and analysis for reasonableness of the researcher's conclusions regarding the consistency of the sets of ratios.

At PlumbCo, all five episodes had consistent ratios (see Table 5-18), an effect that was also apparent in PartCo's four episodes (see Table 5-18). At MotorCo, two of the three alignment episodes had consistent ratios. Episode 1, however, had a higher incidence of change in the external environment than in the internal alignment factors (6:0:2:1:1:0).

	PlumbCo						**PartCo**					**MotorCo**			
Alignment Factor	E1	E2	E3	E4	E5	**T**[10]	E1	E2	E3	E4	**T**	E1	E2	E3	**T**
EE	3	1	1	1	0	**6**	2	0	1	0	**3**	6	2	4	**12**
SG	1	0	0	0	1	**2**	1	0	0	0	**1**	0	0	1	**1**
SI	1	1	1	1	1	**5**	1	1	1	1	**4**	2	1	1	**4**
OS	2	0	0	1	0	**3**	1	1	2	0	**4**	1	2	3	**6**
IS	1	0	0	0	1	**2**	0	1	0	0	**1**	1	0	1	**2**
IT	1	1	2	2	2	**8**	2	0	0	0	**2**	0	0	3	**3**

Table 5-17: Number of Alignment Factor Changes per Episode

The analysis of the ratio of changes per episode indicates that 11 of the 12 episodes support Proposition 5, while Episode 1 at MotorCo did not. Hence Proposition 5 is supported based on a preponderance of the evidence.

Episode	**Changes Per Alignment**
PlumbCo	EE:SG:SI:OS:IS:IT
E1	3:1:1:2:1:1
E2	1:0:1:0:0:1
E3	1:0:1:0:0:2
E4	1:0:1:1:0:2
E5	0:1:1:0:1:2
PartCo	EE:SG:SI:OS:IS:IT
E1	2:1:1:1:0:2
E2	0:0:1:1:0:0
E3	1:0:1:2:1:0
E4	0:0:1:0:0:0
MotorCo	EE:SG:SI:OS:IS:IT
E1	6:0:2:1:1:0
E2	2:0:1:2:0:0
E3	4:1:1:3:1:3

Table 5-18: Ratio of Changes Per Episode

[10] T represents "Total"

5.3.4 Proposition 6 – Dynamism of Change

Proposition 6 combines the individual dimensions of change from Propositions 3 through 5 to propose a composite construct that represents the overall dynamism of the outer environment. Propositions 3 to 5 each individually identifies a specific dimension of change: level, magnitude, and pace, respectively. These influences do not, however, occur in isolation. Instead, the environment can be influenced by all three dimensions during any given period of time. Based on this interaction, Proposition 6 suggests a relationship between a composite construct of all three individual dimensions of change and the likelihood that the internal structure of an alignment factor will require change. Proposition 6 thus formally states that the more dynamic the outer environment (greater the level, magnitude, and pace), the greater the likelihood that the internal structure of an alignment factor will need to be altered.

As presented in the chain of evidence (Appendix B), Proposition 6 is examined by creating a composite measure for dynamism by combining the individual measures used to test Propositions 3 to 5. This composite measure can then be compared to the number of changes in the alignment factors during the same alignment episode. In essence, this measure is a ratio that compares the measure of dynamism in the outer environment of the internal alignment factors to the number of changes in the internal alignment factors.

The numerator of the ratio is derived by assigning a point value to the perceived magnitude (High=5, Medium=3, Low=1) (independent variable from Proposition 4) for each initiating change then multiplying each magnitude value by the level (EE=6, SG=5, SI=4, OS=3. IS=2, IT=1) (independent variable from Proposition 3) in which the initiating event occurred and then summing all of the change triggers for each alignment episode ((magnitude of change event 1 X level) + (magnitude of change event 2 X

level)…. +(magnitude of change event n X level)). Note that summing the initiating change events for each alignment episode incorporates pace (independent variable from Proposition 5) into the composite measure.

For example, there were two triggering events (EE-1 & EE-2) for Episode 1 at PlumbCo. Both of these triggering events were perceived to be of high magnitude by the interviewees at PlumbCo and each event was thus assigned a value for magnitude of five. Both of these triggering events occurred in the external environment which is the sixth level in the TAGA model (see Figure 2-2). The two triggering events for Episode 1 at PlumbCo were calculated as follows: EE-1 = 5 X 6 = 30, EE-2 =5 X 6 = 30. To factor in pace, the magnitude and level scores for each of the events were summed (30 + 30 = 60) to produce a composite measure of 60 for the dynamism of the outer environment during Episode 1 at PlumbCo.

The denominator of the ratio, which represents change in the internal structures of the alignment factors, is the sum of the related alignment factor changes in each alignment episode. For example, during Episode 1 at PlumbCo, there were six changes in lower level alignment factors (SG-1, SI-1, OS-1, OS-2, IS-1, and IT-1) resulting from the two triggering changes. The denominator for the ratio is therefore 6. The composite measure for dynamism for Episode 1 at PlumbCo is therefore 60:6.

Support for Proposition 6 is indicated by a ratio where the greater the dynamism in the outer environment (level, magnitude, and pace) the greater the number of related changes in the internal alignment factors. Therefore, a ratio with a high numerator and high denominator such as 100:6 or with a low numerator and low denominator such as 10:1 is supportive of Proposition 6. Numerators with a low numerator and high

denominator such as 10:6 or a high numerator with a low denominator such as 100:1 would not support Proposition 6. The ratio of 60:6 from Episode 1 at PlumbCo was thus interpreted as supporting Proposition 6. Table 5-19 presented the detailed calculations for each alignment episode, while, Table 5-20 presents a summary of the findings.

As with the measure in Proposition 5, the determination of support for Proposition 6 requires discretion on the part of the researcher, that is, any cutoff point for determining support for Proposition 6 is subjective. The reader can examine the ratios and analysis for reasonableness of the researcher's conclusions as to the consistency of the sets of ratios.

The analyses revealed that MotorCo exhibited a pattern consistent with Proposition 6, but that PlumbCo and PartCo did not (see Table 5-20). At PlumbCo and PartCo, there was no obvious pattern to the ratios by episode (see Table 5-20). Episodes 1 and 5 at PlumbCo supported of Proposition 6, while Episode 2 exhibited a large numerator (120) and a low value (2) in the denominator. Episodes 3 and 4 at PlumbCo exhibited a small numerator indicating that the environment was not dynamic, but had denominators of 3 and 4, respectively, in the denominators. At MotorCo, all three episodes were consistent with Proposition 6. Specifically, Episodes 1 and 2 indicated that the environment was only moderately dynamic with four and five related changes in the denominators, respectively, while Episode 3 exhibited a dynamic environment and eight changes to the internal structure of an alignment factor.

The aggregate analysis showed no discernable pattern. Based on a preponderance of the evidence of both the within case analysis and aggregate-case analysis, there is no support for the notion that the dynamic nature of the environment as evaluated here is

related to the need for the internal structure of an alignment factor to change. Proposition 6 was not supported.

By Trigger/Episode

Calculation: (magnitude X level) + (magnitude X level)…..= a measure of the likelihood of change. Therefore the greater the measure, the greater the likelihood of change in the internal alignment factors.

Values Magnitude: high=5, medium=3, low=1
Level: EE=6, SG=5, SI=4, OS=3, IS=2, IT=1

Case	Episode	Episode Trigger	Magnitude	Level	Total	Number of Lower Level Alignment Factor Change Events	
PlumbCo	1	EE-1	5	6	30		
		EE-2	5	6	30		
					60	**6**	SG-1, SI-1, OS-1, OS-2, IS-1, IT-1
	2	EE-1	5	6	30		
		EE-2	5	6	30		
		EE-3	5	6	30		
		EE-4	5	6	30		
					120	**2**	SI-2, IT-2
	3	IT-2	1	1	**1**	**3**	SI-3, IT-3, IT-4
	4	SI-4	1	4	**4**	**3**	OS-3, IT-5, IT-6
	5	EE-5	1	6	6		
		EE-6	5	6	30		
					36	**5**	SG-2, SI-5, IS-2, IT-7, IT-8
PartCo	1	EE-1	5	6	**30**	**5**	SG-1, SI-1, OS-1, IT-1, IT-2
	2	EE-1	5	6	**30**	**2**	SI-2, OS-2
	3	EE-2	3	6	**18**	**4**	SI-3, OS-3, OS-4, IS-1
	4	EE-1	5	6	**30**	**1**	SI-4
MotorCo	1	EE-1	3	6	18		
		SI-1	3	4	12		
		EE-3	3	4	12		
					42	**3**	SI-2, OS-1, IS-1
	2	EE-1	3	6	18		
		SI-1	3	4	12		
		EE-2	3	6	18		
					48	**4**	SI-3, OS-2, OS-3, OS-4
	3	EE-2	3	6	18		
		EE-4	3	6	18		
		EE-5	3	6	18		
		EE-7	3	6	18		
		EE-8	5	6	30		
		EE-9	3	6	18		
		EE-10	5	6	30		
		EE-11	3	6	18		
					168	**8**	SG-1, SI-4, OS-5, OS-6, IS-2, IT-1, IT-2, IT-3

Table 5-19: Calculation of Magnitude

Case	Episode	Ratio
PlumbCo	E1	60:6
	E2	120:2
	E3	1:3
	E4	4:3
	E5	36:5
PartCo	E1	30:5
	E2	30:2
	E3	18:4
	E4	30:1
MotorCo	E1	42:3
	E2	48:4
	E3	168:8

Table 5-20: Ratio of Calculated Dynamism to Changes in Alignment Factors By Case

6 Discussion

In this chapter, we review the results of our research to identify key findings and to discuss their relevance and applicability to research and practice. Recall that we examined the research question: How does IS enable organizations to adapt to change? Taking a positivist approach to a multiple-case study, we developed and tested propositions that, first, compared the theory of alignment as guided adaptation with the theory of alignment viewed as synchronization. Second, as the first step to understanding the role of IS in enabling organizations to adapt to change, we examined the impact of external dimensions of change on the alignment factors.

The findings for Phase I are presented followed by those for Phase II. Next, relevant issues not attributable to a particular phase are discussed. Finally, the contribution of the research is presented.

6.1 Discussion of Phase I Results

The purpose of Phase I was to assess TAGA in multiple organizational settings. TAGA was developed based on data from a firm that was mid-sized and that had a non-strategic view of IS. Phase I was, therefore, designed to address these boundary conditions to assess whether TAGA would generalize to additional business contexts. Proposition 1 examined the pattern of alignment in two large corporations. As predicted by Proposition 1, Hypothesis 1b, the pattern observed in both large company case sites was consistent with TAGA. None of the alignment episodes for our large firm cases 2 and 3 exhibited a pattern similar to that predicted by alignment as synchronization.

Instead, TAGA was more explanatory than alignment as synchronization in all of the observed alignment episodes.

Proposition 2 examined the pattern of alignment in firms with a formal IS strategy and planning process. All three case sites, that is, both larger firms and the mid-sized firm, were appropriate for examining Proposition 2. As predicted by Proposition 2, Hypotheses 2b and 3b, the pattern was consistent with that predicted by TAGA and not with the pattern predicted by alignment viewed as synchronization. Out of the 11 alignment episodes observed over the three cases, only one, the first episode of PlumbCo, exhibited a pattern similar to that predicted by alignment as synchronization. The remaining four alignment episodes at PlumbCo and the seven episodes observed at PartCo and MotorCo did not exhibit a pattern of alignment as described by alignment as synchronization.

Alignment viewed as synchronization explains one alignment episode but fails to explain the patterns observed in the other 11 episodes. TAGA, on the other hand, with its short-term decoupling of alignment factors and long-term interdependence of the alignment factors argues that the pattern observed in Episode 1 at PlumbCo is not a necessary pattern to achieve alignment. TAGA, therefore, explains the pattern of alignment observed in all 12 alignment episodes.

The conclusion is that TAGA generalizes to these additional contexts of larger firms and to firms with more formal IS strategy and planning processes. A good theory explains why we would expect certain relationships in the data (Whetten 1989). Applying Whetten's (1989) premise, TAGA's additional explanatory capabilities extend the range of applicability of TAGA as a descriptive theory of alignment.

6.2 Discussion of Phase II Results

The purpose of Phase II was to understand the effect of external change on the internal structure of an alignment factor. An understanding of this nature provides a foundation for management to design the alignment factor in a way that allows the internal structure to remain adapted to its environment, given the characteristics of the environment in which it must function. Understanding these characteristics provides a basis for lengthening the period during which the alignment factor enables organizational goals.

Specifically, then, Phase II was designed to further develop the theory by exploring constructs related to the characteristics of the environment and was designed to accomplish two purposes. The first purpose was to investigate a number of factors influencing change referred to here as the dimensions of change. TAGA proposed that the environment could be characterized by the following dimensions: level, magnitude, and pace of change. TAGA further proposed that a composite measure of the level, magnitude, and pace of change represented the dynamic nature of the environment. Support for Phase II propositions would indicate the role for IS should be to enable organizational change and therefore to minimize periods when IS constrains the organization from moving towards its strategic goals.

Phase II was also designed to explore initial measures for these dimensions. TAGA, in its current stage of development as a theory, supports the dimensions theoretically. These relationships, however, must satisfy the need to be falsified (Popper 1959). Although constructs and propositions can be tested at a higher level of abstraction, it is preferable to operationalize them as variables and hypotheses that are more readily observable and thus more accurately measured and tested (Bacharach 1989).

In the following sections, each proposition is discussed and the support for the dimensions and the initial measures developed here are discussed.

6.2.1 Discussion of Proposition 3 – Level of Change

Proposition 3 examined the level at which the change was initiated. TAGA proposes a hierarchical relationship among the alignment factors, consistent with prior research that indicates structure tends to follow strategy (see, for example, Amburgey & Dacin 1994; Chandler 1962). Recall, however, that TAGA is based on a probabilistic theoretical base and not a causal theoretical base. TAGA does not indicate change must flow down the hierarchy. Instead it indicates that change is more likely to flow down the hierarchy. TAGA allows for the possibility that lower-level change may result in changes to higher-level alignment factors because each alignment factor is a subsystem of the alignment system and changes in a lower-level alignment factor represent changes to the outer environment of all the alignment factors in the alignment hierarchy.

This research examined the data from the cases sites for evidence of the hierarchical relationship among the alignment factors. The majority of change events in the case sites were triggered via higher-level change events. The external environment proved to be the most frequent trigger of change. There was only one event where a lower-level event triggered a change at a higher-level in the alignment hierarchy. This was event IT-2 at PlumbCo where the upgrade to the ERP infrastructure provided additional functionality that facilitated the introduction of ecommerce services. As described above, these results were consistent with TAGA.

PlumbCo specifically states that their use of technology and infrastructure is a strategic asset designed as a platform for developing services to customers that their

competitors cannot provide. The IS strategy of maintaining an up-to-date infrastructure provided new infrastructure functionality that PlumbCo exploited for competitive advantage. PlumbCo's use of technology thus exemplifies how IS can be structured to enable the rest of the organization to reach organizational goals. Hence, TAGA suggests how to use technology to enable the organization to reach its goals and how not to constrain the organization by limiting its ability to adapt to its environment.

When the average change per level was examined, the highest average was observed for changes triggered by strategic initiatives. Specifically, the combined results from the three case studies indicated that change events initiated at the highest level – the external environment - resulted on average in 2.11 lower-level changes, while initiating changes at the strategic initiative (SI) level resulted in an average of 2.5 related lower-level changes (see Table 5-14). While a higher average change at the strategic initiative level is inconsistent with Proposition 3, two factors may explain the results. First, as noted in the results section, several lower-level change events were triggered by compounding effects of multiple triggers thereby diluting the average number of changes associated with the external environment effects by increasing the denominator in the ratio. Second, out of the 21 initiating trigger events observed over the three cases, all but three occurred at the level of the external environment. Thus the lack of lower-level initiating changes is a direct indication that higher-level change is more likely to initiate change in the internal structure of lower-level alignment factors.

The conclusion from this research is that the level at which change occurs impacts the necessity for change in the internal structure of the alignment factors. This research, therefore, supports the notion that level can be measured based on the hierarchical nature

of the TAGA model. Note, also, that the ability of lower-level changes to trigger higher-level changes as the data for IT-2 in PlumbCo indicated is consistent with TAGA's non-determinist theoretical stance that predicts that the hierarchical level increases the likelihood that change will occur, but is not a necessary and sufficient condition for change.

6.2.2 Discussion of Proposition 4 – Magnitude of Initiating Change

The second dimension of change, as stated in Proposition 4, is the magnitude of the change. Magnitude has been identified in prior literature as a way to measure change (see, for example, Huff, Huff, & Thomas 1992; Huff & Huff 1995). The greater the magnitude, the more likely that the internal structure of an alignment factor will require change.

In this study, events reported as being of greater magnitude were indeed related to a larger number of change events of internal alignment factors compared with events reported as being of medium or low magnitude. Hence the findings support Proposition 4. Examining the data by individual case reveals, however, that at MotorCo there was a large number of initiating change events reported as medium and these triggers had a higher average number of internal alignment factor changes associated with them than did the higher magnitude triggering events. There are two explanations for this inconsistency. First, magnitude is a composite construct derived from both the stress the organization is under and the organization's resistance to change. Stress is predicted to induce change, while resistance to change is predicted to restrain change. Thus magnitude is constructed from two opposing forces, neither of which has been well

validated as a measure that may be contributing to the results (again, see, Huff, Huff, & Thomas 1992; Huff & Huff 1995).

Prior research indicates that resistance to change is related to the length of time the core beliefs, structures, control systems, etc., have been in place (see, for example, Gersick 1999; Tushman and Romanelli 1985). MotorCo forms part of the largest and oldest firm examined in this research. In fact, MotorCo is the founding division of the firm, dating back to the late 1800's. It is possible that the maturity of the division created an environment where deeply rooted core structures and beliefs created a substantial resistance to change. This may have resulted in a period where the stress was not great enough to overcome the resistance to change resulting in more frequent, smaller changes, a situation observed by several researchers (again see, for example Gersick 1991; Sabherwal, Hirschheim and Goles 2002; Tushman and Romanelli).[11] The early stage of development of the construct measure does not allow for a more detailed analysis to properly explore how the two opposing forces may have caused this situation and further research is warranted.

Second, there could be an issue of scale anchoring. MotorCo may have experienced much greater changes prior to this research period that influenced the individual's perceptions of the magnitude of change. MotorCo also had the most changes in its external environment of any of the three case sites. It is possible the high frequency of environmental change could have influenced the individuals' perceptions of the magnitude of change.

[11] The references cited all used punctuated equilibrium theory to explain the series of smaller changes. Ward and Vessey (working paper) address the phenomenon of punctuated equilibrium as a special case of TAGA. See that paper for additional explanation.

Third, the case study data in this study did not permit statistical analysis. It is possible that the difference between the averages is not statistically significant and the main conclusion to draw is that further research into magnitude as a measure is needed, particularly research where the study methodology supports statistical analysis to determine whether there is a significant difference among changes of different magnitudes.

One final point with respect to magnitude is that the chain of evidence for Proposition 4 indicated that the results of the magnitude relationship would be triangulated with financial results. This was not possible due to a lack of data, however. PlumbCo is a closely-held corporation that does not publish financial data and only limited financial information could be obtained during the study. PartCo had financial data only for the five year time period following the merger, making the rolling five-year examination inappropriate. MotorCo was a division of a public company that had gone through several corporate and subunit reorganizations, making it impossible to compare annual financial data.

6.2.3 Discussion of Proposition 5 – Pace of Change

The third dimension represents a measure of change over time, or "pace." Proposition 5 indicated that the greater the pace of change in the outer environment, the more likely that the internal structure of an alignment factor will require change. While the data from the case studies supported Proposition 5, there are three issues regarding the data that need to be discussed. First, the short episode duration may have limited the impact that pace might otherwise have had on the alignment factors. Most alignment episodes were of short duration with a low number of change events per episode. There

were a total of 12 alignment episodes identified over the combined 25 years of the histories of the three companies. Thus the average episode lasted a little over two years.

Second, it was unclear how to determine a "standard" or "cutoff point" for evaluating the alignment episode change ratios. Any specific cutoff point would include a subjective dichotomy that is difficult to support theoretically. Note that this is similar to the criticism of punctuated equilibrium theory with respect to how to determine whether a change is evolutionary or revolutionary in nature.

Third, there were potentially confounds in the measurement of pace. Because pace is a function of time, it was necessary to have a specified time frame to delimit the measure. The alignment episodes were the most consistent way to do so. In all three cases there were alignment factor change events triggered by events that occurred in prior alignment episodes. Using episodes to delimit the time frame, however, resulted in events related to a change trigger that occurred outside the alignment episode, being excluded from the measure and thus reducing the number of changes in the lower level alignment factors.

6.2.4 Discussion of Proposition 6 – Dynamism of Change

Proposition 6 examines the effect of the three individual dimensions (level, magnitude, and pace) into an overall measure of the dynamism in the outer environment. The three individual measures were quantified and then combined to create an overall measure. Using this composite measure, Proposition 6 was not supported.

There are two potential explanations for the lack of support for Proposition 6. First, the most conservative conclusion is that there is simply no cumulative effect of the three dimensions with respect to the need for the internal structure of an alignment factor to change. Second, it is possible that the lack of support is the result of the exploratory

nature of the measurements of the dimensions; that is the triggering events and related change events by episode may not be an appropriate way to address the relationship. The formula used to calculate dynamism may also be inappropriate. There is reason to suspect the latter. The measures are imprecise and thus combining them into a single measure may have lead to further imprecision so that no pattern could be determined. With general support for the three individual dimensions, it seems likely that the lack of support for a cumulative measure is the result of the exploratory nature of the measures. The conclusion is that further research is needed to examine whether this is a valid construct and, if so, how it can be measured.

6.3 Methodological Considerations

The specific data analyses conducted were chosen for consistency. This approach focused on using initiating changes for analysis and focusing on the bi-variate relationships between alignment factors. As with all data, a number of alternative approaches could have been used. The alternative approaches are based on different assumptions as to the definition of initiating change events and on whether to focus on episodes or relationships.

Initiating change events, for example, could have been defined as any change event related to a change in an internal alignment factor as opposed to the initiating change events for an alignment episode. By this alternative definition, every change that was related to another change could be considered to be an initiating change and included in the calculation of measures associated with the dimensions of change measures. Another alternative approach would have been to restrict relationships to those that occurred within an episode rather than examining them both within and across episodes as was

done for all propositions except 5, which specifically limited the relationships to a single episode to examine pace. Using this approach, any event that was related to another event in a different episode, would not have been included as part of the alignment pattern. By including the relationships even though they crossed episode boundaries, more relationships were included in the analysis, which resulted in a more conservative analysis, particularly for Propositions 1 and 2.

The additional analyses based on differing definitions and alternative calculations were conducted and reviewed as part of a thorough analysis of the data and an attempt to learn about potential measures for the constructs. The alternative approaches did not reveal substantially different results and the added complexity did not warrant altering the presentation of the results from that proposed in the chain of evidence. The alternative approaches available are an indication, however, that, while the data indicated initial support for the dimensions of change (level, magnitude, and pace), the measures require additional development and research.

One final note on the difficulty in analyzing the data is that underlying TAGA is the notion that the constraints on an internal alignment factor can be minimized by proper design of their internal structure. While every attempt was made to ensure reliability and validity in the data, at this stage in the research it was not possible to determine how well designed and thus adapted to its environment any one alignment factor was. Thus the degree of adaptability of the internal structure of the internal alignment factors is an uncontrolled variable that may have confounded the data.

6.4 Limitations of the Research

While every attempt was made to conduct rigorous and relevant research, as in all research, this research has its limitations. The main limitations of this research can be related back to the early stage of theory development and the infancy of the related research stream.

First, the early stage of theory development and the infancy of the related research stream of this research dictated case studies as the appropriate methodology. Case studies generalize to theory and to the additional business contexts in which TAGA was examined. While TAGA does generalize to the additional contexts of larger firms and firms with more formal IS strategy and planning processes, these are only two additional contexts out of many possible. Additional research is required to continue to test boundary conditions and increase the generalizability of TAGA. Further note that statistical generalizability does not apply to case study methodology (Lee and Baskerville 2001). Determining the statistical generalizability of TAGA is likewise left for future research, to be conducted when the constructs can be measured more accurately for which surveys and experiments are the preferred methodology.

A second limitation was the use of high-level constructs for Phase II. Using high-level constructs limited the depth with which the theory could be examined. Hence propositions rather than hypotheses were used to describe the relationships among the constructs. It was necessary to use higher-level constructs and propositions because no prior measures existed. This lack of existing measures is one of the reasons case study methodology was appropriate (Yin 1994). And while every attempt was made to collect data in a reliable and valid fashion, it is important to point out the limitations of these attempts to measure the constructs and to consider them within the context of case study

method. Recall, that one of the goals of the research was to explore ways to develop such measures for future research.

A third limitation of the research is the use of interviews to examine prior events. Perceptions and memories of individuals are known to contain inaccuracies and to change as time passes, thereby reducing reliability in any one individual's responses. As noted in Chapter 4, several methodological techniques were used to minimize this known limitation to interviewing. First, the timeframe was limited to a ten-year period. Second, a structured interview guide was used to standardize the collection of data across individuals. Third, interviewees were selected from multiple areas of the firms to provide triangulation and to minimize the potential of bias.

A fourth limitation relates to the data analysis. Due to the nature of qualitative data and the early stages of the research, a "preponderance of the evidence," similar to that used in a civil law suit, was used to interpret the data. Every effort was nonetheless taken to collect and develop reliable and valid data. There remains, however, the risk of subjective interpretation. The results therefore have the potential for variance in their interpretation. Hence additional research is required to develop quantifiable measures for the constructs explored in this research, which together with statistical analysis, would decrease the subjectivity in the interpretations of the results. As noted earlier, however, the lack of measures was a limitation due to the early stage of theory development and not a flaw of the research design.

Finally, this research examined strategy taking into account differences between goals and initiatives and, within the confines of the MotorCo case, corporate level versus business unit level strategy. Strategy, however, is a complex construct with a substantial

body of supporting research. Examining goals and initiatives and corporate and business unit level strategy are only two of the many aspects of strategy that require examination. For example, no distinction was made between strategy and tactics and no other categories or attempts to classify or measure strategy (e.g., Miles and Snow's Defenders, Analyzers, and Prospectors or Porter's value chain or industry position) were conducted.

6.5 Further Insights into the Adaptation Process

Several additional issues arose that did not fit into the proposition structure, either because they were unique to an individual case or because they addressed issues that impacted all of the Propositions. Those issues are discussed in this section.

6.5.1 Discussion of PlumbCo as a Revelatory Case

PlumbCo was a revelatory case as defined by Yin (1996). PlumbCo was the only company where there was an episode that exhibited a pattern of traditional alignment where change in all four alignment factors occurred. This was the first episode we examined at PlumbCo. PlumbCo's market structure was changing and PlumbCo's size ($450 million) put the firm at risk in the evolving environment. As a reaction necessary for survival, PlumbCo set a goal to grow large enough to survive and realigned its organization to accomplish this goal. As noted, this period exemplified the traditional pattern of alignment and illustrates how alignment theory has been interpreted as "synchronization" with the company changing across all factors to realign with its changing environment. Note, however, that the following four alignment episodes at PlumbCo did not require a synchronized pattern of change for the company to maintain alignment. This fact is consistent with TAGA, which predicts that when change occurred

in the following alignment episodes, it was only the alignment factors that were no longer adapted to their environment that changed while the other factors remained adapted.

The alignment episodes and patterns at PlumbCo highlight a theoretical issue important for supporting TAGA that is difficult to examine in IS alignment research. This issue is: "how do we know whether the company was out of alignment and that change to an alignment factor or factors brought them into alignment, or whether a change in an alignment factor resulted in the organization moving from alignment to an out-of-alignment period?" The implication for both alignment as synchronization and for TAGA is determining whether an isolated change to an individual alignment factor may be moving the company in to or out of alignment.

From the PlumbCo case data, it seems clear that in 1995 PlumbCo was out of alignment. Their market (external environment) was changing and PlumbCo's existing position left them facing severe business difficulties. The alignment episode that followed demonstrated a traditional pattern of alignment as synchronization where all of the alignment factors were "realigned" in order to meet the needs of the changing environment. Thus the first episode of PlumbCo provided a baseline period of alignment from which the additional changes to the alignment factors can be compared[12].

As previously discussed, none of PlumbCo's following four episodes exhibited the process of alignment as synchronization, exhibiting instead, decoupled alignment patterns. The argument based on alignment as synchronization would be that the additional alignment factor change events left PlumbCo out of alignment. But this was

[12] Although this alignment episode exhibits a pattern consistent with traditional alignment as synchronization, TAGA likewise provides a theoretical explanation of this alignment episode as well as the other alignment episodes as discussed in detail in Section 6.1

not the case. In fact, PlumbCo has been very successful since the traditional pattern of alignment occurred starting in 1995. Consistent with TAGA and not the theory of alignment as synchronization, the additional decoupled changes to PlumbCo's alignment factors allowed them to remain adapted to their environment and served to maintain alignment, demonstrating that decoupled changes occur as predicted by TAGA.

Another revelatory aspect of the PlumbCo case is that starting with their strategic long range planning in 1995 IS became part of their overall business strategy. In other words, PlumbCo did not have just a formal IS strategy. By focusing on using IS to provide a competitive advantage, PlumbCo, in effect, elevated IS to a business level strategy. It is possible that this distinction is a substantial one and one that is theoretically consistent with TAGA.

Instead of having IS react to changes in the external environment and other alignment factors, which appears to be a common approach (as observed at PartCo and MotorCo), IS was altered in a proactive fashion, enabling flexibility in the organizational and IS structure. Thus when changes at higher levels occurred at PlumbCo, it was less likely that lower-level changes were required. To express this in the theoretical terms of TAGA, the lower-level alignment factors of the organizational and IS structure were designed in a way that they not only remained adapted to the changes in their outer environment, but enabled the business to leverage the infrastructure for competitive advantage. In other words, their internal structure was sufficiently flexible to accommodate the dynamism in their environment. This effect was observed on several occasions at PlumbCo and is exemplified by Strategic Initiatives 2, 3, and 5. All three of these initiatives resulted in no changes to lower-level alignment factors, while in the other

two case sites, out of seven alignment episodes, only SI-4 at PartCo, the failed hostile takeover, did not result in lower-level changes. It is suspected that the difference is due to PlumbCo's enabling approach to IS, while the other two companies focused on using IS in a supporting role, subservient to the business strategy.

6.5.2 The Role of IS Strategy

As noted above, the three firms had different IS strategies, but the overriding goal for IS strategy was to support the business, an approach that tended to remain consistent over time. Over the 12 alignment episodes across the three firms, there were only five changes in IS strategy, the lowest number of changes in the internal alignment factors.

At PartCo, the one IS strategy mentioned was a convergence strategy. Immediately after the merger, there was no formal IS strategy, simply a focus on integration to consolidate the two company structures. After the immediate consolidation needs were met, PartCo turned its focus to convergence. The role of technology at the company was very much a support role and, while it had a well developed IS strategy and planning process, the goal of the process was to support the business needs and to minimize costs. Hence the business goals drove the convergence strategy because it was difficult to cost-effectively support the increased cross-organizational information sharing needs with multiple, disparate systems.

MotorCo was similar to PartCo in that it had a sophisticated IS strategic planning process, but IS again functioned as support for the business goals. The first IS strategy evidenced at MotorCo came in 1999 when an IS strategy was implemented to make sure the company did not face catastrophic systems failure as a result of Y2K. The second change in IS strategy was due to the organizational goals shifting to focus on cost cutting

in SG&A costs. This change led the company to institute an IS strategy focusing on centralization.

As described in detail in the previous section, PlumbCo was the most progressive of the three case sites in its strategic use of technology. PlumbCo experienced two changes to IS strategy over the ten years. The first was during the first alignment episode when PlumbCo, in effect, focused on IS as a strategic initiative. The IS strategy that followed was to maintain an up-to-date IS infrastructure that could support innovative services for the customer. PlumbCo's second strategy evolved from the first strategy. It focused on supporting the strategic goals of the business by delivering more useful information from their data.

In two of the three cases (i.e., PartCo and MotorCo), the IS strategy was not essential to business; instead it played a role not unlike that of the accounting and finance departments or the manufacturing departments. IS was important, but only from the standpoint that it supported the business; that is IS is not the primary focus of the business at PartCo and MotorCo. PlumbCo was the exception.

All three of the companies examined were successful, prospering businesses despite the differing roles and views on the importance of IS. The conclusion is that, as demonstrated by PlumbCo, IS can be a key strategic asset, but as indicated by TAGA and as demonstrated by PartCo and MotorCo, this is not a necessary and sufficient condition for success. IS is only one tool that can be used to accomplish the goals of an organization. There are multiple paths to accomplish business goals and IS may or may not be a dominant part of this.

6.5.3 Additional Alignment Factors

Prior research (see Ward and Vessey working paper) and the data analysis conducted here indicated that future research may want to examine the potential for additional alignment factors to accurately reflect the theory of alignment as guided adaptation. The data indicated that alignment factors for corporate level strategy and management may provide further explanatory power to TAGA. First, a corporate level change was considered an external environmental change for the analysis of MotorCo, which was a subdivision of a Fortune 500 company. Further research is required to determine if this is sufficient or whether an additional external alignment factor should be identified for corporate level influence on business units. The influence of corporate structure and a corporate level strategy on a business unit is not an uncommon occurrence in today's large corporations. The impact of this influence on alignment needs further research and development.

Second, while TAGA specifically argues for the role of management in guiding the alignment process, the current model does not specifically identify the role of management. There are indications from the data that such a construct should be examined more closely. For example, in both PartCo and MotorCo, changes in high-level executives were mentioned as substantial change events and as influencing the direction the companies took. Additionally, management's proactive changes can alter the internal structure to meet perceived changes in the environment before the actual environmental trigger occurs as was frequently the case with companies implementing ERP in anticipation of Y2K. Future research needs to focus on the role of management and whether it is an internal or external alignment factor.

6.6 Contributions of the Research

Our research makes several contributions to the literature. The implications of the research to the IS field is discussed first, followed by a discussion of the implications for practice.

6.6.1 Implications for Research

First, this research further develops a descriptive theory of alignment between business and IS. Existing research, in particular that of Henderson and Venkatraman (1993), and research that built on that work, has tended to focus on prescriptive aspects of alignment and falls short in providing a description of how alignment actually occurs over time. The theoretical approach of Henderson and Venkatraman (1993) further fails to explain why some companies can be successful despite an apparent lack of IS alignment. TAGA on the other hand, specifically addresses the question of how alignment actually occurs and provides an explanation for how firms can be successful despite a non-strategic approach to IS. As a result, TAGA represents a significant contribution to the literature on IS alignment.

Second, this research established initial measures for the characteristics of change in external environment. Specifically, this research established that level, magnitude, and pace of change in the environment influences change in the internal alignment factors. These measures are exploratory and require additional research, but initial support suggested that these measures can be used as a basis for designing information systems that match the IS capabilities with the environment in which they must operate.

A third theoretical contribution of TAGA is that it recognizes that the alignment process can be guided. Prior research focuses on management having total control over the company. TAGA, on the other hand, considers the impact of largely uncontrollable

external influences and the ability of management to guide the firm via its goals and strategic initiative.

By providing a theoretical basis for describing how IS aligns with the business, TAGA provides a theoretical foundation for future research in IS. This represents a fourth theoretical contribution of this research. For example, the concepts of flexibility and agility are at the forefront of today's discussions of IS infrastructure for which theoretical approaches such as dynamic capabilities and the resource-based view of the firm have been used as justification. The theoretical basis of dynamic capabilities or the resource based view of the firm provides few guidelines, however, as to how the IS should actually be structured to support these notions. TAGA on the other hand, provides a theoretical foundation upon which the role of IS in enabling an organization can be developed to adapt to changed circumstances. TAGA could therefore bring a new theoretical perspective to research on IS adaptability and infrastructure flexibility.

6.6.2 Implications for Practice

Our research has several implications for practice. First, because the theory of alignment as guided adaptation reflects the way in which companies actually address alignment issues, our research provides practitioners with a more realistic framework within which to address their future technology needs. Rather than attempting to align IS with the business, that is, seeking to have IS react to business changes as quickly as possible once they arise, our theory suggests that IS management should seek to implement platforms that enable a range of possible future scenarios.

Second, our research suggests that practice could use our notions of alignment as guided adaptation as a basis for planning their IS needs into the future. TAGA indicates

that it is less important to focus on maintaining alignment and more important to focus on how IS may enable or constrain the ability of the organization to adapt to future changes (and hence the organization's ability to reach its goals). Thus managers may wish to shift their focus from building alignment processes into an organization's IS strategy and planning processes and focus more on the enabling characteristics of their IS structure and processes, and on limiting their constraining aspects. For example, instead of reviewing whether the business and IS strategies are aligned, managers may want to review potential limitations of the existing IS structure and processes to see if they can be overcome before they restrict the organization from adapting to future changes.

7 Conclusion

This research addresses an issue that has been of primary importance to both business and IS over the past two decades, the process of aligning IS with the business. The theory of alignment as guided adaptation, or TAGA, has its theoretical roots in the evolutionary and ecological theories of strategy process (see, for example, Barnett & Burgelman 1996; Burgelman 1991 1994; Hannan & Freeman 1982; Nelson & Winter 1977; Noda & Bower 1996) and in particular, the formulation of strategy process presented by Lovas and Ghoshal (2000) that characterizes the evolutionary process as one of guided evolution. TAGA further draws upon the theoretical work of Simon, incorporating concepts of a sciences of the artificial, to explain how a business and its subsystems adapt to its environment. TAGA's key theoretical concept is that by viewing the alignment factors as subsystems of the larger alignment system, in the short run, the alignment factors behave approximately independently of the behavior of the other components even though, in the long run, the alignment factors are interdependent.

TAGA thus indicates that, in the short run, each of the four internal alignment factors, business and IS strategy and structure, adapts to changes in their environment to the extent possible and therefore only needs to change their internal structure and functioning when they are no longer adapted to their external environment. This implies that, even when there are changes to the alignment system, alignment can be maintained without corresponding, individual changes to all of the internal alignment factors. This view

contradicts prior work that implies alignment can only be maintained by altering (i.e., realigning) all of the alignment factors in response to change.

This research shows that TAGA can be generalized to additional business contexts and, like the study from which the theory was developed, demonstrates its superiority over the traditional view of alignment as synchronization in describing how alignment actually occurs. This research, based on the corollary that change is initiated in the outer environment of an alignment factor, also supports the notion that change in the external environment can be characterized by the level, the magnitude, and the pace at which change occurs. Further, this research shows that these dimensions can describe the likelihood that the internal structure of the alignment factors will need to be changed.

The goal of this research was to further develop TAGA, not only as a descriptive theory of alignment, but as a foundational theory to develop the role of IS in organizations. In extending TAGA to additional contexts and in developing characteristics likely to lead to change in the internal alignment factors, this research also paves the way for the conduct of research into how to sustain alignment over time.

7.1 Directions for Future Research

While the three cases examined in this research provide support for TAGA and the impact of the dimensions of change on change in the internal alignment factors, this was merely the next step in the development of TAGA. There are several possible avenues for future research.

First, research needs to continue to test TAGA in different contexts thereby extending the generalizability of TAGA and establishing its boundary conditions. Future research

should examine boundary conditions such as business and IS strategy and tactics, IS governance approaches, impact of industry, and position in the value chain.

Second, future research also needs to further develop the dimensions of change. In particular, magnitude and pace require the development of more precise measures. Additional research also needs to further examine whether the three dimensions can be used as a composite measure of the overall dynamism of the environment.

Third, research is required that addresses the potential impact of additional alignment factors on TAGA. The role of management needs further exploration and represents a stream of research that has the potential to make a contribution to areas such as IS governance and IS strategic planning. Corporate level influence likewise represents a potential alignment factor that needs further development and research.

Fourth, determining enabling and constraining characteristics of the internal alignment factors, and in particular IS, represents a valuable avenue for future research that directly impacts the role of IS in the business organization. Such a notion, itself, leads to a number of possible research directions. This information can be used to design information systems that support the level, magnitude, and pace of change in the outer environment in a way that better enables a company to achieve its goals. It is equally important to understand how adaptations to IS structure and processes may ultimately constrain the organization, and how to limit those constraints. This stream of research needs to determine how to transition an organization from a state that is constrained by its IS to one that is enabled by its IS. Research could therefore be conducted to investigate how IS constrains organizational alignment, as well as the factors that play a key role in constraining the adaptation process.

Fifth, TAGA applies not only to "systems," in general, but also to the infrastructure that forms part of those systems, the theory, therefore, could be used as the basis for addressing infrastructure issues. IS infrastructure is an area addressed in a significant amount of IS research (see, for example, work by Broadbent and Weill 1993). TAGA provides a theoretical basis for examining the resources used to create a flexible infrastructure. Specifically, how can the flexibility be matched directly to the level, magnitude, and pace of change in the environment in a way that allows the IS to enable business goals? This understanding of adaptation provides a solid foundation for understanding, flexibility, and agility, and matching the flexibility and agility of the IS infrastructure to the needs of the business.

Sixth, it is clear that additional work is needed in the area of IS strategy. The existing literature is fragmented and inconsistent in its definition and tends to focus on the IS strategic planning process. Therefore, research is needed to examine what constitutes IS strategy and how to define it. Further research is also needed to understand the role of IS strategy in the alignment process.

7.2 Final Comments

Research on TAGA provides a theoretical basis for changing the way the IS community views the role of information technology in a business organization. Alignment has been viewed traditionally as "fit" or "synchronization" between information technology and the business strategy and structure (Henderson and Venkatraman 1993; Sabherwal et al. 2001; Smaczny 2001). TAGA, on the other hand, indicates that IS alignment can be viewed as the ability of information systems to enable the organizational adaptation process. From this perspective, firms can view themselves

as in alignment as long as their information systems are sufficient to support their organizational goals.

To conclude, this research indicates that the goal of information systems should be that of enabling business goals and the goal of IS management should be to maximize the period during which IS enables the organization and to minimize the constraining periods. The key to alignment is in understanding that, in the short-run, the information system can be viewed as its own subsystem, decoupled from the overall alignment system. Of course an enabling IS structure is not without cost. It is necessary to consider the nature of the environment and determine the proper investment required to maintain this enabling relationship. Thus the role of managers is to structure their information systems in a way that balances the cost of maintaining an enabling relationship with the business's need to remain adapted to its environment.

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Appendix A – Semi-Structured Interview Guide and Follow Up Surveys

This document is intended to serve as a guide for data collection and interviewing subjects in conjunction with a multi-site (3) case study being conducted for a dissertation. The purpose of this case study is threefold. First, the generalizability of TAGA will be assessed by testing TAGA in additional organizational settings. Second, dimensions of external change are developed to determine the impact of external change on the alignment factors. Third, data will be collected on the role of IS in enabling organizational adaptation. The goal is to understand how IS enables an organization to adapt to its environment. The questions are open ended, designed to allow the response to provide insight and minimize the risk of interviewer bias in the data collection.

This case study will collect evidence from both interviews and archival documents.

Evidence to collect:

- Interviews – information concerning specific variables (IS strategy, IS planning, etc.), process, and descriptions of change events of significance to the organization over the last 10 years.
- Documents – SEC filing documents such as quarterly, annual, and special event reports (10K, 10Q, and S4)

The interviews are to be conducted with the top-level managers that have knowledge of, or responsibilities for, the areas under study.

Semi-Structured Interview Guide

Interviewee: _____ Date: _____

Title: _____ Company: _____

Job Description/Area of Expertise: _____

1. **Introduction**
    a. Explain Project
        i. Background of Researcher(s)
        ii. Project addresses IS alignment
            1. Compares traditional alignment model with TAGA
            2. Assess generalizability of TAGA
            3. Developed the dimensions of external change
            4. Examines the role of IS in enabling organizational adaptation
        iii. Discuss Human Subjects Committee Form
            1. All interviews are VOLUNTARY
            2. All interviews are CONFIDENTIAL
            3. Have interviewee sign and date form
            4. Provide interviewee with copy
    b. Interview Overview
        i. This interview will ask questions related to IS alignment in your organization.
        ii. Questions will address the alignment factors
            1. External Environment
            2. Management Decisions (data collection only)
            3. Strategic Intent (goals)
            4. Strategic Initiatives (means)
            5. Organizational Structure
            6. IS Strategy
            7. IS Structure
        iii. Interviewees will be asked to identify and describe change events in each of the alignment factors, including what triggered the changes and any relationships between the changes and other alignment factors.
        iv. Interview should take 60 to 90 minutes.

2. Interview Questions

Phase I
Interview Data to Collect for Proposition 2

Degree of Formal IS Planning Process (H2)	**Answer**
Is there a formal IS Planning Process?	Yes No
Policies and procedures greatly influence the process of strategic information systems planning within our firm. (Segars and Grover 1999)	1….2….3….4….5
We utilize formalized planning techniques in our strategic information systems planning process. (Segars and Grover 1999)	1….2….3….4….5
Our process for strategic planning is very structured. (Segars and Grover 1999)	1….2….3….4….5
Written guidelines exist to structure strategic IS planning in our organization. (Segars and Grover 1999)	1….2….3….4….5
The process and outputs of strategic IS planning are formally documented. (Segars and Grover 1999)	1….2….3….4….5

Degree of Formal IS Strategy (H3)	**Answer**
Is there a formal IS strategy?	Yes No
Policies and procedures greatly influence the formulation of IS strategy within our firm. (adapted from Segars and Grover 1999)	1….2….3….4….5
We utilize a formalized process for developing our IS strategy. (adapted from Segars and Grover 1999)	1….2….3….4….5
Our process for developing our IS strategy is very structured. (adapted from Segars and Grover 1999)	1….2….3….4….5
Written guidelines exist to establish an IS strategy in our organization. (adapted from Segars and Grover 1999)	1….2….3….4….5
The IS strategy is formally documented. (adapted from Segars and Grover 1999)	1….2….3….4….5

List change events that have occurred in the last 10 years. (Important for all Phases)(A change event is defined as any change that resulted in a strategic or structural change to the organization)

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Complete for <u>each</u> change event listed

Describe the change event.

What caused the change (Trigger)?

Why was the change significant to the organization (impact)?

Did the change event impact other alignment factors? (Use back of page if additional space is needed)

Alignment Factor	Impact on Factor
Management Event (for data collection purposes only)	
Strategic Intent	
Strategic Initiative	
Organizational Structure	
IS Strategy	
IS Structure	

Additional comments?

Phase II

Level of Change (Proposition 3) (Based on alignment factor level in which change initiated. To be determined by model.)

Magnitude of Change (Proposition 4)

Describe the success of the company/subunit at the time of the change. (Stress) (Huff, Huff, & Thomas 1992)	High	Average	Low
Describe the success of the company/subunit during the five year period prior to the time of the change. (Stress) (Huff, Huff, & Thomas 1992)	High	Average	Low

Pace of Change (Proposition 5) (The count of change events per level per episode. To be determined from model)

Dynamic Nature of Change (Proposition 6) (To be determined from combination of Propositions 3, 4, & 5.)

Follow Up Magnitude Surveys

PartCo

This brief questionnaire is a follow-up to the research I conducted at PartCo during November of last year in which you were a participant. I am seeking further information on the events interviewees identified at that time. The questionnaire should take less than 10 minutes to complete. Please email the completed questionnaire to me at kwward@indiana.edu or fax it to 402-554-3400. Your prompt attention is greatly appreciated. If I do not hear from you within two weeks, I will contact you to determine if there is a more convenient way to get your feedback such as via a telephone call.

The survey has two purposes.

The first purpose is determine the accuracy of a list of events representing the most significant events at PartCo from 1995-2004, inclusive, based on a compilation of all interviews and other data sources. This review process gives those who participated an opportunity to examine the list of events and provide feedback on its accuracy. Please provide any feedback in the space provided following the survey. Please feel free to use additional space if necessary.

The second purpose is to determine the ***magnitude*** of each of the events. In completing your response for each event, please consider issues such the stress on the company's financial health and the company's resistance to the change.

The list of events appears below.

Please indicate as High, Medium, or Low, the *magnitude* of each change on your company.				
Year	**Event**	**Answer**		
1995	Proliferation of Big Box Retailers	High	Medium	Low
1995	Consolidation of Wholesalers	High	Medium	Low
1995	Strategic Long Range Planning Process resulted in a primary corporate goal of grow with a secondary focus on reducing costs.	High	Medium	Low
1995	Development of Technology Infrastructure	High	Medium	Low
1995-7	Consolidated Distribution from 15 to 4 Warehouses	High	Medium	Low
1996	Moved from Divisional Structure to a Matrix/Functional Structure	High	Medium	Low
1996	Maintain a Technologically Up-to-date IS Infrastructure	High	Medium	Low
1997-8	Implemented SAP R/3			
1998	Increasing Competition from Foreign	High	Medium	Low

	Manufacturers			
1998	Leveraging Technology Infrastructure for Cost Savings	High	Medium	Low
1999	Buyback of Family-owned Stock	High	Medium	Low
1999	Introduction of ecommerce	High	Medium	Low
1999	Upgraded to SAP Version 4.0b	High	Medium	Low
2000	Increasing Regulation of Hazardous Materials Content	High	Medium	Low
2000	Go Live on SAP Human Resources Module	High	Medium	Low
2001	Upgraded to SAP Version 4.6c	High	Medium	Low
2002	Inflation in Raw Materials	High	Medium	Low
2002	Growth via Acquisitions	High	Medium	Low
2002	Acquired HangCo	High	Medium	Low
2002	Go Live with SAP at Poland Subsidiary	High	Medium	Low
2002	Converted Acquisition (HangCo) to SAP	High	Medium	Low
2003	Updated SLRP: Growth, Lean, and MAX	High	Medium	Low
2003	Innovation Via New Product Development	High	Medium	Low
2003	Focus on Content Delivery	High	Medium	Low
2003	Implemented SAP Business Warehouse	High	Medium	Low
2004	Upgraded to SAP Version 4.7	High	Medium	Low

Please indicate any additional events that you believe should be included on the list and indicate why you believe they should be included.

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Please indicate any events that you believe should not be included on the above list of events and brief explanations for why they should be excluded.

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Please provide any other information you think may be relevant.

PartCo

This brief questionnaire is a follow-up to the research I conducted at PartCo during July and August of last year in which you were a participant. I am seeking further information on the events interviewees identified at that time. The questionnaire should take less than 10 minutes to complete. Please email the completed questionnaire to me at kwward@indiana.edu or fax it to 402-554-3400**.** Your prompt attention is greatly appreciated. If I do not hear from you within two weeks, I will contact you to determine if there is a more convenient way to get your feedback such as via a telephone call.

The survey has two purposes.

The first purpose is determine the accuracy of a list of events representing the most significant events at PartCo from 2000-2004, inclusive, based on a compilation of all interviews and other data sources. This review process gives those who participated an opportunity to examine the list of events and provide feedback on its accuracy. Please provide any feedback in the space provided following the survey. Please feel free to use additional space if necessary.

The second purpose is to determine the ***magnitude*** of each of the events. In completing your response for each event, please consider issues such the stress on the company's financial health and the company's resistance to the change.

The list of events appears below.

Please indicate as High, Medium, or Low, the *magnitude* of each change on your company.				
Year	**Event**	**Answer**		
2000	The merger of company A and Company B	High	Medium	Low
2000	New EPA emission standards to take effect in 2007	High	Medium	Low
2000	Strategic goal to become the number 1 supplier to the automotive OEMs	High	Medium	Low
2000	Strategic focus on cost cutting following the merger	High	Medium	Low
2000	The consolidation of management and organizational structures immediately following the merger	High	Medium	Low
2000	The consolidation of the IT infrastructures immediately following the merger	High	Medium	Low
2000	The de-implementation of J. D. Edwards and return to legacy mainframe system at the Exhaust Technologies division	High	Medium	Low
2001	Strategic move to assembly of modules	High	Medium	Low

2001	The development of emission products for new EPA standards (Commercial Segment)	High	Medium	Low
2001	Moving plants closer to customer plants	High	Medium	Low
2001	Establishment of IS convergence strategy (consolidation and standardization)	High	Medium	Low
2002	Inflation in raw materials prices (steel, etc.)	High	Medium	Low
2002	Reorganization of company structure to three divisions (CVS, LVS, and LVA)	High	Medium	Low
2002	Acquisition of remaining interest in ABC Company	High	Medium	Low
2003	Failed attempt to acquire WXYZ	High	Medium	Low
2003	Divestiture of ABC division	High	Medium	Low
2004	Proposed sale of LVA	High	Medium	Low

Please indicate any additional events that you believe should be included on the list and indicate why you believe they should be included.

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Please indicate any events that you believe should not be included on the above list of events and brief explanations for why they should be excluded.

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Please provide any other information you think may be relevant.

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MotorCo

This brief questionnaire is a follow-up to the research I conducted at MotorCo during October of last year in which you were a participant. I am seeking further information on the events interviewees identified at that time. The questionnaire should take **less than 10 minutes to complete**. Please email the completed questionnaire to me at kwward@indiana.edu or fax it to 402-554-3400. Your prompt attention is greatly appreciated. If I do not hear from you within two weeks, I will contact you to determine if there is a more convenient way to get your feedback such as via a telephone call.

The survey has two purposes.

The first purpose is determine the accuracy of a list of events representing the most significant events at MotorCo from 1995-2004, inclusive, based on a compilation of all interviews and other data sources. This review process gives those who participated an opportunity to examine the list of events and provide feedback on its accuracy. Please provide any feedback in the space provided following the survey. Please feel free to use additional space if necessary.

The second purpose is to determine the ***magnitude*** of each of the events. In completing your response for each event, please consider issues such the stress on the company's financial health and the company's resistance to the change.

The list of events appears below.

Please indicate as High, Medium, or Low, the *magnitude* of each change on your company.				
Year	**Event**	**Answer**		
1983	Continuing Best Cost Strategy	High	Medium	Low
1996	Proliferation of the Internet	High	Medium	Low
1997	Shift in Corporate Level Strategic Initiatives	High	Medium	Low
1997	Initiating an eBusiness Strategy	High	Medium	Low
1997	Shifting Manufacturing Plants to Mexico	High	Medium	Low
1998	Concerns over Y2K	High	Medium	Low
1998	Stated Strategic Importance of IS and Development of Corporate-wide Procurement System	High	Medium	Low
1998	Focus on Y2K Compliance	High	Medium	Low
1999	Reorganization of Corporate Business Segments	High	Medium	Low
2000	Establishment of Corporate-wide Internet Connectivity Service	High	Medium	Low

2000	Crash in Technology Market and Recession in U.S. Economy	High	Medium	Low
2000	Increasing Foreign Competition	High	Medium	Low
2000	Shift in Business Unit Level Strategic Goal from Growth to Profitability	High	Medium	Low
2000	Focusing on End Customer	High	Medium	Low
2000	Creation of Commercial Industrial Motors Division	High	Medium	Low
2000	Off-Shoring of Manufacturing	High	Medium	Low
2000	Establishment of eBusiness Group	High	Medium	Low
2001	Creation of Corporate-wide IT Shared Services.	High	Medium	Low
2001	Adoption of Oracle as Corporate-wide Enterprise Application	High	Medium	Low
2001	Reductions in SG&A Costs	High	Medium	Low
2001	Outsourcing of SG&A Tasks	High	Medium	Low
2001	Centralization/Leveraging Corporate-wide IS Resources	High	Medium	Low
2001	Formation of IT Shared Services	High	Medium	Low
2001	Initial Implementation of Oracle as MotorCo's Standard Enterprise Application	High	Medium	Low
2002	Legislative Response to Corporate Scandals (Sarbanes Oxley Act)	High	Medium	Low
2002	Increased IS Security and Compliance with Sarbanes Oxley Act	High	Medium	Low
2003	Inflation in Raw Material Prices	High	Medium	Low
2003	Reorganization of CIM into Four Business Units	High	Medium	Low

Please indicate any additional events that you believe should be included on the list and indicate why you believe they should be included.

_____
_____
_____
_____
_____

Please indicate any events that you believe should not be included on the above list of events and brief explanations for why they should be excluded.

Please provide any other information you think may be relevant.

Appendix B – Chain of Evidence

A chain of evidence is a case study research tool that increases reliability (Yin 1004). The purpose is to create a logic flow or "chain" from the initial research question to conclusions from the research similarly to the way evidence in a criminal investigation is tracked. This is accomplished by mapping out the research to be conducted from the research questions to the data to collect ultimately to how the data will be interpreted. Any outside observer should be able to examine the Chain of Evidence and be able to trace the steps the researcher took to reach conclusions presented in the research.

***Overall Research Question: How does IS enable organizations to adapt to change*?**

Phase I

Research Question 1	How does the organization's contextual setting impact the pattern of change in the internal alignment factors?
Proposition 1	Firms exhibit decoupled patterns of IS alignment, independent of firm size.
Hypothesis 1	**H1a:** Large firms exhibit traditional patterns of alignment as synchronization where a change in one factor is related to changes in all four internal alignment factors. **H1b:** Large firms exhibit decoupled patterns of change among the four internal alignment factors.
Data to Collect	Firm size (Independent Variable) will be determined by gross revenues (sales). Respondents will be asked to identify and describe change events for all factors of alignment (Dependent Variable).
How to Analyze Data	Firms with gross revenues between 20 million dollars and 1 billion dollars will be considered midsized. Firms with gross revenues in excess of 1 billion dollars will be considered large. The pattern of change will be coded into tables consistent with Table 4.1 and will be analyzed as discussed in the Data Analysis section, consistent with Figure 4.2. A linear alignment pattern or stair step pattern as in the first two examples of Figure 4.2 will support alignment as synchronization (H1a), while patterns without direct links to changes in other alignment factors, as represented by the remaining three examples in Figure 4.2, will support TAGA (H1b)
Implications/Link	Large firms are the focus of proposition 1. The pattern of change events will be examined for organizations with gross revenues of 1 billion dollars or more to determine whether the pattern matches

	alignment as synchronization or alignment as guided adaptation. If a pattern of alignment as synchronization is observed, the data provides disconfirming evidence of H1b and support for H1a. Disconfirming H1b indicates that firm size is an important element in the synchronization of IS with the business strategy and structure. Support for H1a establishes boundary conditions for both alignment as synchronization and alignment as guided adaptation. Alternatively, if a pattern of alignment of guided adaptation is observed (less structured, apparently random change pattern), it will provide disconfirming evidence of H1a, indicating TAGA is more explanatory than alignment as synchronization in large firms.
Research Question 1	How does the organization's contextual setting impact the pattern of change in the internal alignment factors?
Proposition 2	Firms with a strategic view of IS will exhibit decoupled patterns of IS alignment.
Hypothesis 2	**H2a:** Firms with a formal IS planning process exhibit traditional patterns of alignment as synchronization where a change in one alignment factor is related to changes in all four internal alignment factors. **H2b:** Firms with a formal IS planning process exhibit decoupled patterns in change among the four internal alignment factors.
Data to Collect	Questions will be asked of the respondents to determine whether a formal IS planning process exists or not (Independent Variable). The respondents will be asked five questions from Grover and Segars' (1999) validated instrument for formalized IS planning. Respondents will be asked to identify and describe change events for all factors of alignment (Dependent Variable).
How to Analyze Data[13]	A way to analyze the data would be to require affirmative responses to the question of "is there a formal IS planning process" from the majority of the interviewees and a yes to three out of the five formal IS planning process questions by each of the interviewees. The pattern of change will be coded into tables and will be analyzed as discussed in the How to Analyze Data Section of Hypothesis 1, consistent with Figure 4-1.

[13] TAGA is a process model, and is therefore based on probabilistic relationships. The propositions are guided not by certainty of relationship, but by increased likelihood (correlation not causation). Additionally, case study research, while allowing for the collection of quantitative data, does not lend itself to statistical analysis that would provide for statistical generalizability. Therefore, as discussed in Section 4.5, a "preponderance of the evidence" will be used to make determinations about to analyze and determine whether the data support the hypotheses and propositions. The explanation described in the How to Analyze Data Section provides a detailed example of how the data may be analyzed.

Implications/Link	If a formal IS planning process exists and a pattern of alignment as synchronization is observed, it provides disconfirming evidence of H2b and supports H2a. Disconfirming H2b will indicate that a formalized IS planning process is an important element in the synchronization of IS with the business strategy and structure. Disconfirming H2b establishes boundary conditions for both alignment as synchronization and alignment as guided adaptation. Alternatively, if a pattern of alignment of guided adaptation is observed (less structured, apparently random change pattern), it will provide disconfirming evidence of H2a, indicating TAGA is more explanatory than alignment as synchronization in firms with a formal IS planning process.
Research Question 1	How does the organization's contextual setting impact the pattern of change in the internal alignment factors?
Proposition 2	Firms with a strategic view of IS will exhibit decoupled patterns of IS alignment.
Hypothesis 3	**H3a:** Firms with a formal IS strategy exhibit traditional patterns of alignment as synchronization where a change in one alignment factor is related to changes in all four internal alignment factors. **H3b:** Firms with a formal IS strategy exhibit decoupled patterns of change among the four internal alignment factors.
Data to Collect	Questions will be asked of the respondents to determine whether a formal IS strategy exists (Independent Variable). The respondents will be asked five questions adapted from Grover and Segars' (1999) validated instrument for formalized IS planning. Respondents will be asked to identify and describe change events for all factors of alignment (Dependent Variable).
How to Analyze Data	A way to analyze the data would be to require affirmative responses to the question of "is there a formal IS strategy" from the majority of the interviewees and a yes to three out of the five formal IS strategy questions by each of the interviewees. The pattern of change will be coded into tables consistent with Table 4.1 and will be analyzed as discussed in the How to Analyze Data Section of Hypothesis 1, consistent with Figure 4-1.
Implications/Link	If a formal IS strategy exists and a pattern of alignment as synchronization is observed, the data provides disconfirming evidence of H3b and support for H3a. Disconfirming H3b indicates that a formalized IS strategy is an important element in the synchronization of IS with the business strategy and structure.

Support for H3a establishes boundary conditions for both alignment as synchronization and alignment as guided adaptation. Alternatively, if a pattern of alignment of guided adaptation is observed (less structured, apparently random change pattern), it will provide disconfirming evidence of H3a, indicating TAGA is more explanatory than alignment as synchronization in firms with a formal IS strategy.

Phase II

Research Question 2 What characteristics of change in the outer environment impact the adaptation of an internal alignment factor?

Proposition 3 The higher the level in the alignment hierarchy at which change occurs, the greater the likelihood that the internal structure of an alignment factor will need to be altered.

Hypothesis None

Data to Collect The evidence collected on change events at each of the factor levels will be used.

How to Analyze Data The independent variable (level of alignment) will be determined based on the hierarchical model presented in Figure 2.2 and described by TAGA. Each initiating change event at each level will be analyzed. The dependent variable will be the number of related changes in the levels surrounding the initiating change event (both higher and lower levels). A way to analyze the data is to examine each episode based on the dimension of level to determine the number of related changes in the levels above and below the initiating change event. For example, consider change events S3, ISS4, and IS5 in Figure 4-1. S3, ISS4, and IS5 are the first (initiating) change events in a series of related changes.

- S3 is related to SI4, OS4 and ISS5. The number of lower level change events associated with S3 is therefore 3. The number of higher level change events associated with S3 is 0.
- ISS4 is related to IS6; therefore the number of lower level change events associated with ISS4 is 1. There are no (0) related change events at a higher level related to ISS4.
- IS5 is related to ISS6 and therefore has 1 related higher level change associated with it. There are no (0) lower level change events related to IS5.

	One way of accomplishing the analysis of data and providing support for P3 would be to take the average number of related changes associated with a change that initiated at each level. For example, examining Figure 4-1, the average number of related changes for change initiated at each level and the total number of all of the changes at each level can be calculated). For example, the results for initiated, related changes indicate that a change in the external environment resulted on average in 2.167 related changes in lower alignment levels. The average number of related changes associated with a change in strategic intent is 1. The average number of related changes associated with a change in strategic initiative is .4 while the average related change for organizational structure, IS strategy and IS structure is 0, .167, .12 respectively.
Implications/Link	The key to interpreting the data will be a "preponderance of the evidence" to see if in the "majority" of initiating change events, the higher levels of change resulted in more changes in the lower alignment factors than change events initiating at lower levels. Patterns such as those associated with S3 and ISS4, where the related changes associated with S3, a higher level in the alignment hierarchy, resulted in three lower level changes while ISS4, a lower level in the alignment hierarchy was associated with only one lower level change, may be interpreted as providing support for Proposition 3. Patterns such as IS5, where the change in a lower level is related to a later change in a higher level (ISS6), or in situations where lower level changes are related to a greater number of related changes than are the changes that initiate in the higher alignment levels may be interpreted as not supporting P3. A decline in the average number of related changes may also provide support for P3, while an alternative pattern where the average increases as the level decreases may be interpreted as not supporting P3
Research Question 2	What characteristics of change in the outer environment impact the adaptation of an internal alignment factor?
Proposition 4	The greater the magnitude of change in the outer environment, the greater the likelihood that the internal structure of an alignment factor will need to be altered.
Hypothesis	None
Data to Collect	Proposition 4 will be examined based on notions of stress (Huff & Huff 1995; Huff, Huff & Thomas 1992) derived from the interview data. Stress is defined as "a summarizing concept that expresses

ways in which current strategy is not satisfactory; it reflects the dissatisfactions of the individual actors and imperfections in the fit between the organization and its environment." (Huff, Huff, & Thomas 1992.) Evidence of stress will be collected by asking respondents to evaluate the level of stress that the organization was experiencing related to the change event. Stress will be operationalized as the respondent's perception of the company's success during the episode in question. The respondents will be asked to estimate the level of stress as low, medium, or high.

Additionally, secondary sources of data will be collected to allow for triangulation of evidence in the current study and to develop quantitative measure for utilization in future research. A secondary source of data for stress will be collected from publicly-available financial statements to determine whether the firm was profitable (Net Income) and had a positive cash flow in the five-year period prior to the identified related change events.

How to Analyze Data

The interview data will be the primary data and will be analyzed based on a "preponderance of the evidence." In other words, the interviews will be reviewed to determine whether the respondents indicated that, in their perceptions, the firm was under stress and how strong the influence of stress was on the firm. The dependent variable will be the number of related change events as in P3. The number of related change events will be examined as they relate to the magnitude of the initiating change.

The primary data from the interviews will be triangulated with the secondary sources of data (the data from the financial statements). A five year period prior to the change events will be examined to consider potential time lags between the firm performance and the change events. A decrease in net income or in cash flow during the five year period prior to the change event will be interpreted as an indication of organizational stress. Additionally, an exploratory aspect to the quantitative data collection is to determine whether the quantitative measures could be further developed for use in additional methodological approaches to researching TAGA. The data will be collected, but the exploratory development of quantitative measures will not be analyzed as part of the dissertation.

Implications/Link

Once the magnitude of the change is estimated, the single change events and related lower level change events identified in assessing P3 will be examined to determine whether P4 is supported. The magnitude of each initiating change event may be compared to the number of related change events associated with each initiating change event. P4 will be supported if change events of greater

	magnitude are more likely related to other change events than change events of lesser magnitude. An average of the number of related changes, as utilized in P3, linked to the different magnitudes of change may also be used for determining support for P4.
Research Question 2	What characteristics of change in the outer environment impact the adaptation of an internal alignment factor?
Proposition 5	The greater the pace of change in the outer environment, the greater the likelihood that the internal structure of an alignment factor will need to be altered.
Hypothesis	None
Data to Collect	Same as for P2
How to Analyze Data	The pace of change at each level of alignment factor will be analyzed by episode. Pace may be measured by the number of changes at each alignment level that occurs during a change episode. It may be possible to create a comparison based on the ratio of change events (EE:S:SI:OS:ISS:IS). For example, the changes that occur at each alignment level of the first episode represented in Figure 4.2 is EE1, S1, OS1, ISS1, and IS1 which represents a ratio among the alignment levels within the episode of 1:1:1:1:1:1. The fifth alignment episode has the following change events: EE5, EE6, SI5, OS5, OS6, OS7, ISS6, IS7, IS8. This translates into a ratio of: 2:0:1:3:1:2. The overall ratio for each episode may also be broken down into four ratios to represent a ratio of external changes to each internal alignment factor (strategic initiatives, organizational structure, IS strategy, and IS structure). For example the ratio 1:1:1:1:1:1 can be viewed as a series of ratios of all the external changes to each internal alignment factor. The first would be 2:1, representing the ratio of external changes to changes in strategic initiatives. The second would be 3:1 representing all the changes in the environment of the organizational structure and then, 4:1 representing the ratio of changes in the IS strategy's environment and finally 5:1 the changes in the environment of the IS structure. The example ratio 2:0:1:3:1:2 would likewise be viewed as a series of environmental to internal change ratios of 2:1, 3:3, 6:1, 7:2. Additionally, the overall ratio for each episode may be compared to create an across episode analysis of frequency that compares the alignment ratios (1:1:1:1:1:1 to 2:0:1:3:1:2).
Implications/Link	P5 will be considered supported if, given the preponderance of the evidence, the rate of change of an internal alignment factor appears

to be related to the rate of change in its environment as measured by the rate of change in alignment factors external to the internal alignment factor. For within episode examination, individual alignment factor ratios may be compared. If based on a preponderance of the evidence, it appears that an increased rate of external change is more likely to result in changes to an internal alignment factor, P5 will be considered supported. The ratios may be examined to determine if the greater the first number, the more likely the second number will be greater than 0. For example event ratios of changes in the alignment factor to changes in the internal alignment factor such as 6:3 or 3:3 may be considered as supporting P5. Alternatively, ratios such as 3:0 or 6:0 may be considered as contrary to P5. For the across episode analysis, ratios of change events by episode will be compared. The across comparison will be examined for consistent patterns where episodes with a high rate of change at one alignment level are more likely to have high rate of change at the other levels and episodes with low rates of change at one level are more likely to have low rates of change at the other levels. For example, patterns across episode ratios such as 1:1:1:1:1:1 and 6:5:7:6:5:5 will be interpreted as supporting P5 while patterns across episodes such as 1:0:0:1:6:1 and 8:0:0:0:1:0 will be interpreted as not supporting P5

Research Question 2 What characteristics of change in the outer environment impact the adaptation of an internal alignment factor?

Proposition 6 The more dynamic the outer environment (greater the level, magnitude, and pace of change), the greater the likelihood that the internal structure of an alignment factor will need to be altered.

Hypothesis None

Data to Collect Same as for P3, P4, and P5

How to Analyze Data The analysis for change events from the other propositions (P3, P4, and P5) will be examined in their totality to determine whether there is an interaction effect among the level, magnitude, and pace of change and the likelihood of adaptation of the other internal alignment factors. The theory suggests that the factors may be combined by considering the magnitude and pace at each alignment level of each episode. One way to do this is to quantify the three measures in order to combine them into one. For example, magnitude may be assigned a number based on either being high, medium, or low as assessed by the perceptions of the interviewees (see P4). A high magnitude may be assigned a point value of 5 while

medium 3 and low 1. Pace may be based on the number of change events at each level. The magnitude of each event at a level could be added together and the sum multiplied by the level of alignment (see Figure 2.2) based on the following point assignments: external environment-6, strategic intent-5, strategic initiatives-4, organizational structure-3, IS strategy-2. For example in the 5th episode in figure 4-1, assume EE5 has a medium magnitude while EE6 is a high magnitude change event. Thus the combined score would be 3+5=8*6 (level) for a total of 46. This could be compared to the number of related changes in the lower alignment factors again creating a ratio where the numerator represents the dynamic rating and the denominator is the number of related changes.

Implications/Link

P6 will be considered supported if changes of greater magnitude, pace, and level are more likely to result in changes to internal alignment factors than are changes of lower magnitude, pace, and level. The greater the numerator and denominator, the stronger the support for P6. Ratios such as 46:6 and 25:6 may be interpreted as supporting P6 while ratios such as 25:1 or 60:2 may be interpreted as not supporting P6

Appendix C – PlumbCo Write-up

The purpose of this confidential report is to provide an overview of the information derived from research conducted at PlumbCo. It reflects aggregate findings based on all interviews and publicly available documentation. The report takes the form of a summary write-up of the company with a focus on the ten-year period starting in 1995 and ending in 2004. This report is therefore a vehicle for sharing our understanding of PlumbCo as well as a means for confirming the accuracy and completeness of our data collection.

The next step is for the researcher to learn from the interviewees if there are any errors or important omissions in this report. ***Feedback to the researcher from the primary contact at PlumbCo is therefore an important part of our research method. Please review the write-up and the attached documents for accuracy.*** We will set up phone interviews to capture your comments, and will then prepare a revised version of this report that can be distributed to all company participants.

Please note the company name is used in this report. The purpose of this report is for your internal viewing only. Any academic documents will ***not*** contain the name of PlumbCo or any PlumbCo brands without PlumbCo's express agreement in order to protect the confidentiality of PlumbCo. Please address any questions to Kerry Ward via email at kwward@indiana.edu or by phone at 812-340-4621.

Finally, I would like to express my gratitude to XXXX XXXX, my principal contact, and the other PlumbCo participants.

Introduction

PlumbCo provided a unique opportunity to study the alignment process in a mid-sized, closely-held organization that has a reputation as an industry leader in the use of technology. On-site interviews with ten employees were conducted at the World Headquarters. The interviews occurred during November of 2004 and inquired into the major events that occurred in business and IS strategy and structure over the ten-year period from 1995 to 2004.

The purpose of this report is to describe the information derived from research conducted at PlumbCo. This report reflects information from interviews, internal documents, and other publicly available sources such as the company web site and practitioner publications.

A brief overview of the company is provided based on current operations. Then a historical account of events important to understanding alignment at PlumbCo is presented, focusing on the event's impact on the company's strategy, structure, and information systems.

Overview of PlumbCo

Established in 1904 as XXXXXXXXXX, PlumbCo is an international leader in the manufacturing of flow control products. These products include plumbing values, fittings and pipe products used in commercial and residential construction. Since inception, PlumbCo has been a closely-held corporation owned by family members and employees. The company is led by CEO XXXX XXXX, a descendent of the original founders. During its one hundred years in business, PlumbCo has grown to

approximately $450 million in annual revenue and today employees over 3400 people, manufacturers over 20,000 SKUs, and services more than 9000 customers.

The market for PlumbCo's flow control products is mature, characterized by low profit margins and low growth, resulting in fierce competition for market share. PlumbCo sells its products through wholesalers and directly to major retailers. Currently, a few large wholesalers such as F. W. Webb and large "big box" retailers such as Home Depot dominate the market. While the industry trend is towards the larger distributors and big box retailers, there remain a substantial number of local and regional distributors.

The vision of PlumbCo is to "lead the world in flow control solutions." PlumbCo accomplishes this by producing a product that is superior to their competition on four dimensions: quality, performance, service, and cost. These flow control products are manufactured in a variety of metals and plastics. Metal products are forged, machined and assembled from bronze, iron and steel. The plastic products use injection molding to convert PVC and ABS resins into plastic pipes and plumbing fixtures. The raw materials are purchased from a large number of vendors and fluctuations in raw material prices impact PlumbCo's profitability.

The business is structured by function, but is considered a matrix organization due to the use of product-oriented business management teams. These teams contain representatives from the functional areas and serve to manage the three key product areas: metals, plastics, and specialty (see Figure 1). PlumbCo has 12 manufacturing facilities including facilities in Mexico and Poland and distributes their product from four distribution centers strategically located across the U.S..

PlumbCo Company History (1995-2004)

This research covers a period of 10 years beginning in 1995 and ending in the fall of 2004, the date of data collection. The data collected from interviews and other documentary sources was coded into change events of significance that represent changes in the business strategies and structures and the information systems strategies and structures over the ten-year period. Each change event has been identified with the following codes, both in the text and in the tables: EE – External Environment, SG – Strategic Intent (Goals), SI – Strategic Initiative, OS – Organizational Structure, IS – IS Strategy, and IT – IS Structure. Definitions for each event can be found in Table 1 and a list of each event by event type is presented in Appendix A.

The events were determined based on a compilation and review of all interviews and other documentary sources. The events are grouped into time-based episodes, demarcated by a change in PlumbCo's business strategy (intent or initiative). Each episode is summarized in Appendix B.

Episode 1: Developing an Infrastructure for Growth

During 1995, the initial period covered by this research, PlumbCo was at a critical juncture. The industry was changing and PlumbCo was in need of a strategy adapted to the changing environment. Traditionally, PlumbCo's customer base consisted of thousands of small plumbing supply wholesalers. These wholesalers were frequently local, family-owned businesses. PlumbCo, although mid-sized by revenue standards, held a leveragable position over the small local wholesalers. The leverage over the small wholesalers and quality of PlumbCo products, had, in the past, allowed PlumbCo to maintain a reasonable profit margin.

During the mid-nineties, however, the market structure for plumbing supplies was quickly changing due to two forces. First, the introduction and proliferation of the "big box" retailers introduced a "direct to retail" distribution channel, bypassing the local wholesalers (EE-1). By 1995, big box retailers such as Lowes and Home Depot represented over $130 billion in annual construction and hardware retail sales. Second, in reaction to the big box retailers, the large number of small, local wholesalers was consolidating, developing into a small number of larger, regional and national wholesalers (EE-2). Companies such as F. W. Webb, Ferguson, Hughes, and Hajoca were emerging as large consolidated wholesalers, some of which were many times larger than PlumbCo. Ferguson, for example, is part of a $6 billion company, with over 17,000 associates at over 1,000 locations in 49 states.

The changing market structure was altering the power distribution of the value chain. PlumbCo was no longer in a dominant position over the wholesalers and, instead, found its profit margins thinning as the growing size of PlumbCo's customers put pressure on product prices. Traditionally, plumbing products were priced based on a set price list; prices were, however, supplemented with a rebate program to the wholesalers. The rebate was tiered so that the greater the product volume a wholesaler purchased from the manufacturer, the greater the per piece rebate. The goal was to lock a wholesaler into carrying only your part as opposed to carrying similar parts from multiple manufacturers.

While the distribution channel was changing, the pricing model was not. The big box retailers, as they grew in volume, were buying in large quantities and demanding price concessions from the manufacturers. Likewise, large wholesalers whose sales volumes qualified for the highest per piece rebate pricing were replacing the traditionally lower

volume, higher margin ma and pa wholesalers. This combination of distribution channel changes was turning plumbing products into a commodity, but without the commodity market pricing mechanisms to pass along rising costs. For example, other commodity products have fluctuating pricing models that allow manufacturers to pass along increases in cost, thus maintaining a consistent profit margin. Because the commodity nature of the product is a relatively new phenomenon in the plumbing products business, the pricing model has not adapted, resulting in the manufacturers' losing profit margin.

PlumbCo realized the need to develop a strategy for succeeding in the changing environment and decided to develop a new strategic plan. In 1995, management conducted a strategic long range planning (SLRP) process and established a cross-function team tasked with reengineering the supply chain. The consensus was that PlumbCo needed to grow in order to compete and compensate for the leverage of the consolidated distributors and the big box retailers. The long-range strategic plan called for aggressive growth (SG-1) with a specific goal for PlumbCo to grow from a $450 million company to a billion dollar company within 10 years. At the same time, but secondary to the growth goal, PlumbCo also realized that the decreasing profit margins required them to reduce costs.

During the strategic planning process and the cross-functional team's investigation, it became clear that PlumbCo's infrastructure could not support their strategic goals. Several strategic initiatives such as changing the inventory process and developing metrics to track customer satisfaction were promoted by teams involved in the process. Each team, however, qualified their suggestions indicating that the initiatives required supporting technology, which PlumbCo lacked.

The company's current legacy systems were deficient for several reasons. First, there was, for all practical purpose, no IS strategy when the systems in question were put in place. The legacy systems were transactional systems implemented by autonomous divisions. Second, the existing legacy systems were aging and disjointed. The company had four major systems that supported different functional areas. They used different databases and none of the systems were integrated so that they could not communicate with each other. The SLRP and cross-functional team concluded that in order for PlumbCo to accomplish its new strategic growth goal, the first thing required was a supporting technology infrastructure.

PlumbCo retained the Boston Consulting Group (BCG) to develop a strategic information system plan. BCG performed a detailed examination of PlumbCo and recommended that PlumbCo replace its fragmented legacy systems with an integrated enterprise system. BCG stressed the importance of developing an integrated, crossed functional, system that provided enterprise-wide integrated data and suggested that PlumbCo install the integrated system by functional areas over the next three to five years.

Based upon the SLRP and recommendations of both the cross-functional team and BCG, PlumbCo decided to develop a technology infrastructure capable of providing a competitive advantage (SI-1). PlumbCo realized they were not going to survive in the changing economic environment by competing on price. Instead, PlumbCo concluded that they could use technology to provide services their competitors could not, and thus differentiate themselves from their competitors.

While developing an IS infrastructure may seem like an IS strategy, in essence, the new strategic long-range plan elevated the role of technology to a business-level strategy. This strategy was to enable PlumbCo to reach its goals by making technology a competitive edge for PlumbCo. The key to PlumbCo's strategy is not simply the development of an IS infrastructure, but maintaining a technologically advanced, up-to-date, infrastructure that would allow them to stay ahead of their competitors in their ability to provide technology-enabled services. Some companies implement new technology that provides a competitive edge immediately after implementation; but then this competitive advantage decays as the technology ages and competitors implement newer technology. The differentiator for PlumbCo was viewing the technology as a corporate-wide strategic asset to be leveraged, and not just a supporting infrastructure.

PlumbCo developed an IS strategy to support the business strategy. PlumbCo's IS strategy was to maintain an up-to-date system capable of providing the most current and effective business processes thereby allowing them to maintain a technological edge on their industry competitors. PlumbCo's IS strategy also included the caveat that the technology must have a cost justified business purpose (IS-1). The business cost justification was based on a holistic view of total cost of ownership that considered IS as a strategic asset and as such, they did not seek to buy the cheapest technology. Instead, they wanted to purchase what was necessary to keep their strategic asset up to date, and to be able to cost justify it based on its strategic purpose and expected business benefits.

A search committee was established to find the best integrated system for PlumbCo. After reviewing several systems including SAP, Oracle, and BAAN, the committee recommended that PlumbCo purchase an integrated system from SAP, the leader in

enterprise resource planning (ERP) software. The committee recommended SAP for its robust functional integration and its flexibility to accommodate PlumbCo's current and anticipated business needs. SAP was the industry leader and was known for its built in "best in class" business processes. This was an important factor because the need to keep the systems current and up to date drove the decision to keep the implementation simple. By implementing the basic "plain vanilla" processes built into SAP, they could avoid the complication of customization that would hinder the ability to upgrade to new releases of the software.

During the mid-nineties, there were not a lot of mid-sized companies implementing SAP because SAP's robust capabilities were expensive. PlumbCo, however, consistent with its strategic initiative, viewed SAP as a strategic asset whose flexibility, robustness and excess capacity would allow them to leverage R/3's capabilities to grow the company and justified its expense based on its importance to PlumbCo's strategic initiative.

In preparation for the SAP implementation and related to the strategic long range planning, recommendations of the cross-functional team and BCG, PlumbCo restructured its organization, moving from a divisional structure, to a functional, matrix structure (OS-1). Prior to this restructuring, PlumbCo was structured by end market with one division for the commercial market and a second division for the residential market (see Figure 2). The two divisions operated autonomously with redundant back office functions, separate sales and marketing functions, and little shared information.

The reorganization eliminated the two divisions and focused on functional processes. This consolidated the back office functions of the separate divisions and eliminated the

divisional duplication. It also enabled standardization. All of these changes set the stage for reengineering the supply chain and implementing the integrated information system.

The functional structure by itself, however, was also problematic in that there was no focus on the end markets. The solution was the implementation of cross-functional teams called Business Management Teams (BMT) to create a matrix structure (see Figure 1). The cross-functional BMT teams were oriented around the three main product lines: metal products, plastic products, and specialty products (hangers, etc.). Each team had a business leader that focused on the product and members on each team represented each functional group: sales, marketing, manufacturing, logistics, finance, and human resources/payroll.

Under the old divisional structure, each division maintained their own distribution systems. This resulted in PlumbCo maintaining multiple distribution centers, frequently within close proximity to each other in major markets. As part of the reorganization, PlumbCo restructured the distribution process (OS-2). The 15 distributions centers were consolidated down to four strategically located regional distribution centers that handled all of PlumbCo's products. This not only reduced redundancy, but the reduced complexity aided in the implementation of the new integrated information system and reengineering of the inventory process.

With the organizational restructuring underway an implementation team was formed during 1996. The team was composed of 26 individuals from within PlumbCo, most with business backgrounds. The team implemented several functional areas (software modules) including: sales and distribution, materials management, production planning, finance/controlling, and fixed assets. On December 30, 1997, PlumbCo implemented

SAP R/3 (IT-1) as a “big bang”, going live across the organization at 10 manufacturing plants and four distribution centers.

Episode 2: Leveraging the Technology Infrastructure for Cost Savings

Once the IT infrastructure was in place, it was anticipated that PlumbCo would move forward with its primary strategic goal of growth. Instead, PlumbCo entered a period that can be described as leveraging the newly implemented infrastructure, primarily to reduce costs (SI-2). PlumbCo did not overtly shift its primary strategic goal of growth to cost reduction following the implementation. Instead, management, out of necessity, simply placed a higher priority on the more immediate need: the need to stabilize and leverage the R/3 implementation, and to counter converging environmental forces with cost cutting.

Following an ERP implementation, most organizations go through two post-implementation phases. The first is a “shakedown” period characterized by the need to fix any problems from the implementation and assimilate the new system into the organization. Once the organization has achieved somewhat normal operations following the implementation, most organizations move to a second post-implementation phase that typically seeks to leverage the system to achieve the benefits expected. PlumbCo was no exception.

There were also several converging environmental influences affecting PlumbCo’s need to leverage the technology infrastructure to reduce costs. First, the proliferation of the big box retailers and consolidation of distributors was continuing to pressure profit margins (EE-1 and EE-2). Second, as PlumbCo moved into the late nineties, foreign competition (EE-3) placed even greater stress on profit margins. The foreign

manufacturers had improved their quality and held a cost advantage, which allowed them to produce similar quality products at a lower cost.

Third, several family members wanted to divest ownership in the business (EE-4). PlumbCo is a fourth generation family-owned business and several family members wanted to sell their interests. The buyout of the family members required cash, placing an even greater need for the firm to leverage their new infrastructure to cut costs and generate cash flow to fund the buyout.

The strategic initiative to leverage the new IS infrastructure and converging environmental pressures on their profit margins, led PlumbCo to move forward with three tactical initiatives that were suggested as part of the 1995 SLRP but not implemented due to the lack of infrastructure to support them.

The first of these changes moved PlumbCo to a demand-pull inventory process. Prior to SAP, PlumbCo relied on a demand-push, make –to-stock manufacturing process. Under the demand-push process, stock levels were set annually based on prior year aggregate customer demand. PlumbCo set manufacturing production scheduling using different information systems for the different divisions. Once produced, the product was shipped to the distribution centers to maintain stock levels. This demand-push process used large batch runs to minimize conversion times resulting in substantial inventory-holding requirements.

In addition to the high inventory holding costs, this process was not responsive to short-term fluctuations in demand. Under the demand-push inventory process, short term fluctuations in demand resulted in what is described as a bullwhip effect where the fluctuations magnified as the fluctuations moved up the supply chain. The result of the

bullwhip effect is out-of-stock situations requiring increasing production that often resulted in stock overages.

Leveraging the real-time information available from R/3, PlumbCo moved to a demand-pull process based on a 12-month rolling average that considered recent demand trends. Inventory zones were established at the distribution centers to track SKU demand. This actual rolling customer demand drove the manufacturing process resulting in smaller, more frequent production runs. The result of the demand-pull manufacturing process is a reduction in cycle time and increase in product availability. Although this has increased the number of set-ups, increased efficiency in the set-up processes has minimized the impact of set-up costs.

During this period, PlumbCo also proceeded with the implementation of a set of customer service metrics. In order to differentiate themselves based on service, PlumbCo needed to be able to measure and manage these services. As a result, the Big Six measures were created. The Big Six customer service metrics include:

- Percent of zoned SKUs with greater than zero inventory
- Percent of orders with zero errors
- Percent of customer phone calls on hold less than 20 seconds
- Percent of shipments on or before promise date
- Percent of shipments with zero errors
- Percent of invoices with deductions

The ability to track these new metrics leveraged information captured in R/3 that was not available prior to the implementation of the new system. The result has been an increase in order accuracy and increasing customer satisfaction.

PlumbCo also used the information available from R/3 to leverage centralized purchasing. R/3 captured information on vendors and purchases, which exposed the fact that PlumbCo was purchasing similar materials from multiple vendors. By enabling the

ability to gather and monitor information on vendors, PlumbCo was able to reduce the number of vendors and increase the order sizes, thus reducing purchasing costs.

The focus on leveraging the new IS infrastructure did not drive other changes in the organization. The gains were made by moving forward with plans developed during the 1995 strategic planning process. This leveraged the newly implemented systems and prior organizational changes and did not trigger any additional structural change events or strategic or structural IS change events. For example, the change to demand-pull inventory leveraged the new IT infrastructure and the consolidation of the distribution warehouses (OS-2), but did not require or trigger additional changes in the organizational structure.

The only significant change event impacting IS during this period was the upgrade of SAP R/3 to Version 4.0b (IT-2). This occurred during 1999, a little over a year after the initial implementation. The upgrade was not triggered by any of the strategic initiatives during this period. Instead, the upgrade was driven by the established IS strategy of keeping systems up-to-date by implementing new releases of the software.

Episode 3: Implementing eCommerce

While PlumbCo continued to look for ways to use their technology infrastructure to impact the bottom line, towards the end of 1999, the company was ready to move forward with leveraging the IT infrastructure for PlumbCo's primary goal of enabling growth. As in episode two, there was no overt decision made to change strategic goals. Instead, it was a natural progression to the implementation of the technology infrastructure. Once the system was in implemented, the focus needed to be on stabilizing and leveraging the new system. Now that the system was stabilized and they

were seeing cost savings, the next step was to use the system more strategically. This manifested itself in the roll out of ePlumbCo (SI-3).

PlumbCo was the first manufacturer in its industry to implement such a robust infrastructure and PlumbCo wanted to leverage the technology infrastructure to provide services to their clients that other manufacturers could not provide. During 1999, PlumbCo rolled out its ePlumbCo e-commerce suite (SI-3). ePlumbCo represents three information technology enabled services that leverage the SAP R/3 infrastructure and the recent upgrade (IT-2).

The first of these services is PlumbCoPartner. PlumbCoPartner is a secure customer web portal that allows customers to access their information such as inventory availability, pricing, order and shipping status, etc. in real-time. Customers can also use the PlumbCoPartner web site to process orders directly over the web without requiring PlumbCo personnel to intervene. The second related service represented by ePlumbCo is Electronic Data Interchange (EDI). EDI allows PlumbCo's customers to electronically exchange information and automate the purchasing and invoicing processes, reducing transaction costs. The third initiative of ePlumbCo is Vendor Managed Inventory (VMI). VMI allows PlumbCo to electronically monitor and automate the reorder of the customer's inventory resulting in substantial transaction cost savings and, even more significantly, allows the customer to reduce their inventory carrying costs.

Using its VMI capabilities, PlumbCo identified key strategic partners and utilized the capabilities of SAP to integrate the inventory and ordering process of these strategic partners. PlumbCo took over monitoring of the customer's inventory and receives a daily update via EDI on the inventory quantities. Purchase orders and invoices are

automatically triggered and created by the system and communicated between PlumbCo and the customer with little or no human interaction. This VMI process extended the efficiency of the demand pull process integrating demand pull all the way out to the customers' inventory and allowed PlumbCo to be the sole supplier of the customer's high volume inventory items.

ePlumbCo did not trigger significant changes in the organization or IS strategy or structure. Rather, it was the existing technology that enabled the ePlumbCo services. The existing IS strategy provided a technology infrastructure that enabled the development of these new services. To implement ePlumbCo, PlumbCo did purchase software from SAP, Net Weaver, that increased the integration with the web interface and R/3. This software, however was not considered an event of any significance by those interviewed.

During 2000, PlumbCo implemented SAP's human resources module (IT-3) and then during 2001, PlumbCo upgrade to SAP Version 4.6c (IT-4). As with the first upgrade, neither the implementation of the human resources module nor the upgrade was prompted by any strategic or structural changes or constraints, but by PlumbCo's IS strategy to implement the most recent technology and to leverage it to stay ahead of their competition.

Episode 4: Growing via Acquisition

As previously noted, SAP provided an IT infrastructure capable of handling greater transactional capacity then PlumbCo currently needed. PlumbCo wanted to leverage this excess capacity by acquiring companies (SI-4) and assimilating them into their IS infrastructure. The assimilation of acquisitions under PlumbCo's IS infrastructure

eliminates duplicate overhead costs, resulting in increased efficiencies and further leveraging the IT infrastructure.

The key to leveraging this excess capacity, however, is the ability to integrate the acquisition into the IS infrastructure. PlumbCo decided that before they would risk integrating an acquisition, they would gain the needed integration skills by integrating their Polish manufacturing plant (IT-5). The Polish plant was an acquisition from the early nineties that had continued to run autonomous information systems after the SAP implementation. The fact that it was already structurally part of PlumbCo made it a perfect for developing the integration skills needed for future strategic acquisitions while minimizing the risk associated with integrating a new acquisition.

An in-house team was assembled to integrate the Polish plant onto PlumbCo's instance of R/3. During the integration, PlumbCo was able to develop reusable integration templates The Poland plant went live in May 2002 with a successful integration and PlumbCo believed they were ready to integrate their first acquisition into their IT infrastructure.

In June of 2002, PlumbCo acquired HangCo (OS-3). HangCo was a privately-held, California-based, company that produced a complimentary product line to PlumbCo's existing flow control products. HangCo thus broadened PlumbCo's product line and increased PlumbCo's sales. Specifically, HangCo manufactured hanging devices that could be used with both its plastic and metal plumbing product lines. HangCo's products were sold to a similar customer base, but HangCo's market was focused on the west cost. PlumbCo's technology-enabled distribution process provided the opportunity to expand the market for HangCo's products to the rest of the U.S. market. PlumbCo move forward

with integrating HangCo into their R/3 instance. The Polish plant experience and knowledge paid off. HangCo was integrated within six months of the acquisition date (IT-6).

Episode 5: Innovating via New Product Development

During 2002-2003 PlumbCo updated their ten-year, strategic long range plan. The situation of the company was much different from 1995 when they first attempted an SLRP. The focus on technology and implementation of SAP that resulted from the first SLRP now provided a strong foundational infrastructure for PlumbCo. The updated SLRP resulted in a restating of the growth goal with a continuing focus on creating a lean enterprise and an additional goal of developing products to meet new environmental regulation (SG-2). While the focus of the organizational goal first stated in the 1995 SLRP was never formally shifted from growth to cost cutting, several individuals interviewed referenced the 2003 SLRP to be a switch from cost cutting to growth.

During this period, there were two additional external forces impacting PlumbCo. The first of these is increasing regulatory requirements for the materials used in PlumbCo products (EE-5). The EPA and state regulatory agencies are increasingly regulating the content of potential harmful materials in plumbing fixtures. Some state legislation, such as California's Proposition 65 is forcing manufacturers to certify that their products are compliant with state standards. These moves have driven the need for an additional goal for PlumbCo addressed in their 2004 performance management plan referred to as MAX. MAX stands for Materials Alternative Exploration. PlumbCo sees the need for compliant products not only as a requirement, but as a strategic opportunity. PlumbCo believes that

if they can beat others to market with compliant products, they can become the standard and thus have an advantage over their competition.

A second environmental event is a resurgence of inflation (EE- 6). During the last few years the price of raw material has increased substantially, placing an even greater burden on profit margins. Whereas in the past, the pressures on profit margins impacted the price PlumbCo received for its products, the inflation in raw materials impacts the cost side. Given the pricing model of standard prices with volume rebates, PlumbCo currently is unable to pass along the additional raw materials costs. The combination of loss of pricing power and inflation in raw materials makes it important for PlumbCo to continue to find ways to operate as a lean enterprise as stated in the updated SLRP.

Based on the environmental factors and the current goals of PlumbCo (SG-2: growth, lean enterprise, MAX), the 2004 performance management plan indicated that a new strategic initiative was to focus on innovation (SI-5). Innovation addresses all of PlumbCo's current strategic goals. Product innovation will allow PlumbCo to generate new regulatory-complaint products and these new products can drive growth. Innovative products likewise allow PlumbCo to differentiate their products and charge a premium over commodity products relieving pricing pressures.

The IS strategy was also updated with the new SLRP. The IS infrastructure and desire to keep it current has proved its value and has become a standard process that is routinized. PlumbCo's IS strategy, therefore, is shifting to focus on content delivery (IS-2). Content delivery focuses on leveraging the current information captured by their ERP infrastructure. The strategy is to deliver the information to those who can use it, when

they need it, by converting the stored data into actionable information that can be leveraged to enable the business goals.

Currently the organizational structure has not changed for the updated SLRP. To support the updated IS strategy, PlumbCo implemented SAP's Business Warehouse (IT-7). The Business Warehouse is a data warehouse that compiles the information captured in R/3 and provides a set of tools to manipulate and query the information. The business warehouse was not triggered by changes to the business strategy or the company structure. Instead, this was somewhat of a unique addition to the IS capabilities in that it supports the new IS strategy. It was initially suggested by the IT department as it continued to look for ways to update the IT infrastructure and leverage the latest technology.

The IT department became aware of SAP's business warehouse product and realized there was a lot of information captured by their R/3 system that was not being used. The IT department queried the business people to determine whether there this would be a useful tool for them. The business users concurred that this would be a valuable strategic asset and the business warehouse was implemented.

The business warehouse will allow improved access to key business analytics. For example, PlumbCo is taking the data on customer ordering and using it to develop a more accurate product demand forecast and further refining its demand-pull process.

PlumbCo believes that the information provided by SAP will also allow them to develop new metrics to better manage their company. For example, PlumbCo currently tracks lines on an order shipped. Although this has been a key metric enabled by SAP that they did not have in the past, it only tells part of the story. A line may represent a

large number of pieces and even though they may have shipped 99 of 100 lines on an order, the 1 line may represent a substantial number of pieces of the order. Therefore they want to improve their metrics by tracking actual pieces shipped.

Consistent with maintaining an up-to-date infrastructure, PlumbCo recently upgrade to R/3 Version 4.7 (IT-8). As in the past, there was no overriding strategy or structural change that drove the upgrade. The upgrade was driven by the normal policy of keeping the infrastructure current.

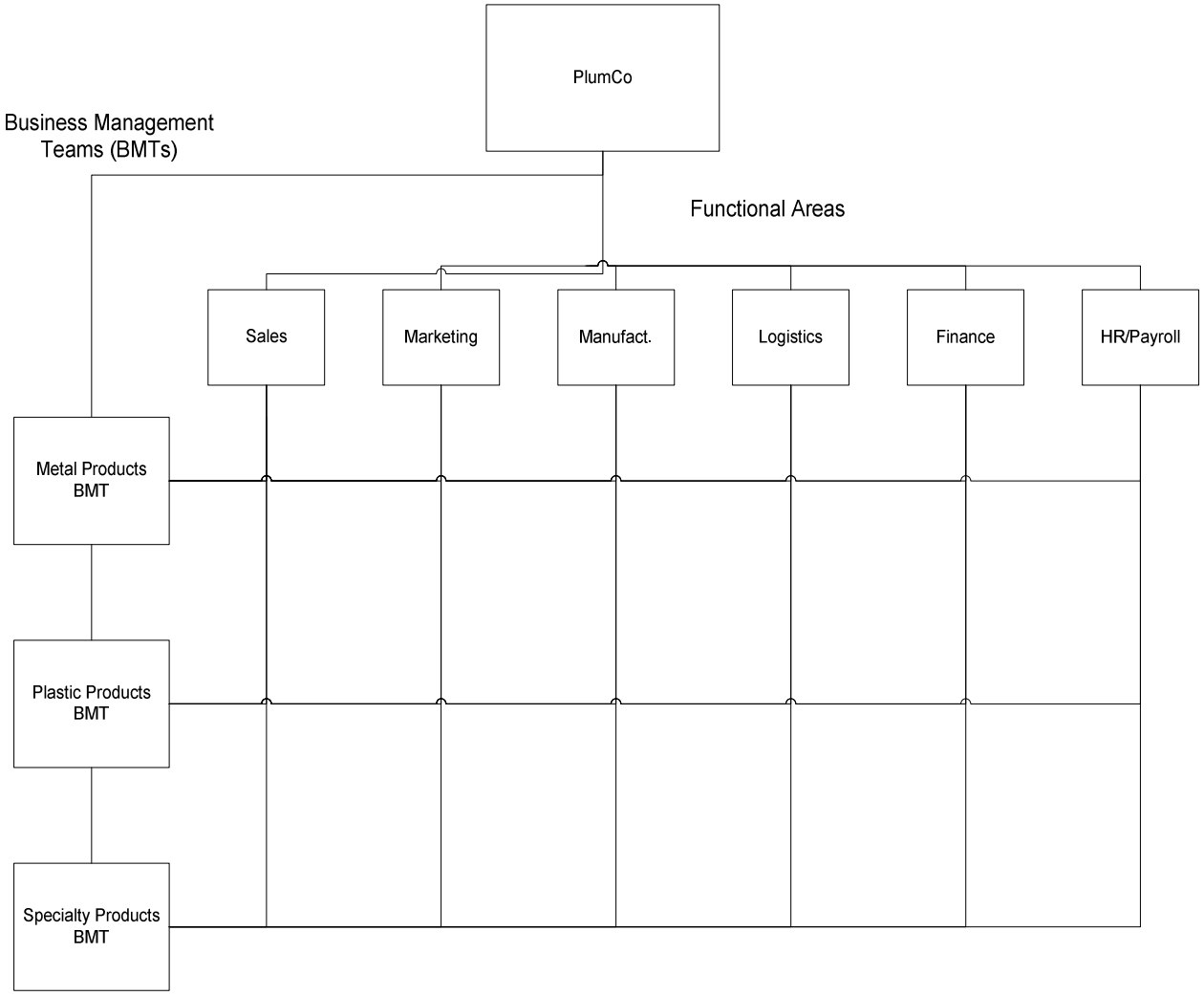


Figure 1: Matrix Organizational Structure

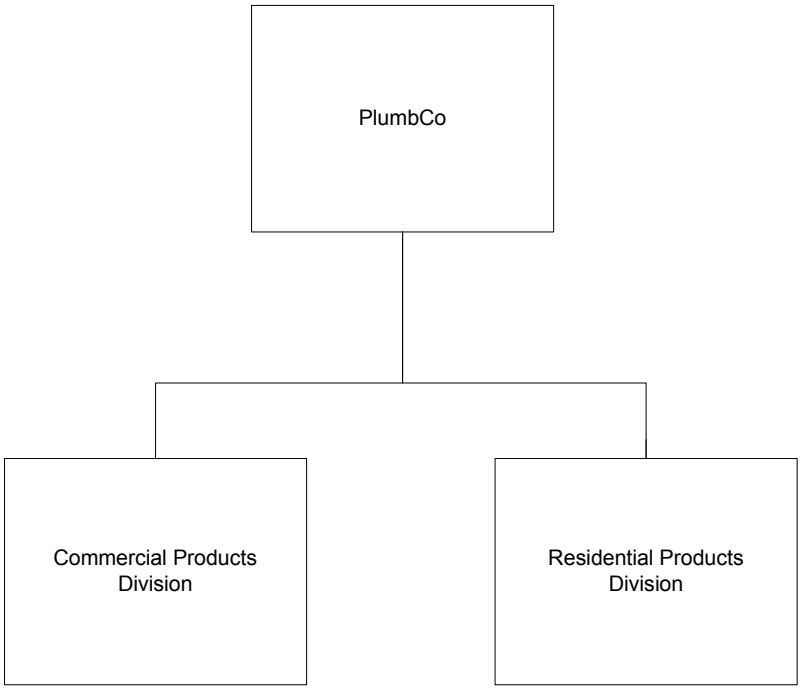


Figure 2: Divisional Organizational Structure

Table 2: Event Timeline

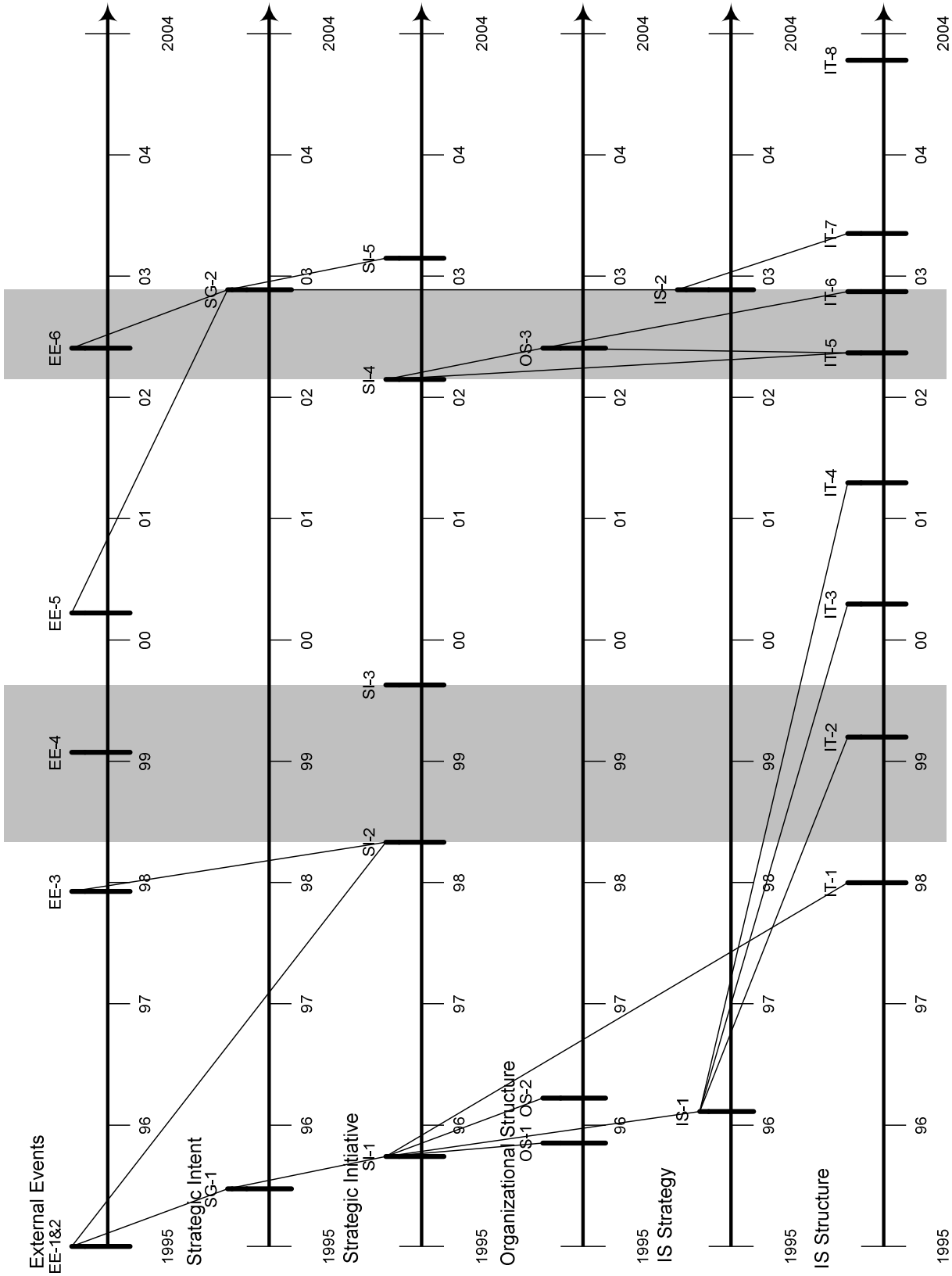


Table 1: Definition of Events		
SG	Strategic intent	Changes in company goals
SI	Strategic initiatives	Changes in business strategy that represent significant changes in the way the company does business
OS	Organization structure	Changes in the way the organization is structured; defined as changes in organizational structure (as represented, for example, in the organization chart) or changes in significant management responsibilities
IS	IS strategy	Changes in strategic initiatives that represent significant changes in the way the company utilizes IS
IT	IS structure	Changes in IS structure and/or processes

Appendix C-1: Event Tables

Table 3a: Changes in External Environment		
	Year[14]	Description
EE-1	1995	Proliferation of Big Box Retailers
EE-2	1995	Consolidation of Wholesalers
EE-3	1998	Increasing Competition from Foreign Manufacturers
EE-4	1999	Buyback of Family-owned Stock
EE-5	2000	Increasing Regulation of Hazardous Materials Content
EE-6	2002	Inflation in Raw Materials

Table 3b: Changes in Business Strategic Intent (Goals)		
Label	Year	Description
SG-1	1995	Strategic Long Range Planning Process resulted in a primary corporate goal of grow with a secondary focus on reducing costs.
SG-2	2003	Updated SLRP: Growth, Lean, and MAX

Table 3c: Changes in Business Strategic Initiatives		
Label	Year	Description
SI-1	1995	Development of Technology Infrastructure
SI-2	1998	Leveraging Technology Infrastructure for Cost Savings
SI-3	1999	Introduction of ePlumbCo
SI-4	2002	Growth via Acquisitions
SI-5	2003	Innovation Via New Product Development

Table 3d: Changes in Organizational Structure and Process		
Label	Year	Description
OS-1	1996	Moved from Divisional Structure to a Matrix/Functional Structure
OS-2	1995-7	Consolidated Distribution from 15 to 4 Warehouses
OS-3	2002	Acquired HangCo

[14] The dates on the events are an approximation based in the combined interviews and review of publicly available data

Table 3e: Changes in IS Strategy		
Label	Year	Description
IS-1	1996	Maintain a Technologically Up-to-date IS Infrastructure
IS-2	2003	Focus on Content Delivery

Table 3f: Changes in IS Structure and Processes		
Label	Year	Description
IT-1	1997-8	Implemented SAP R/3
IT-2	1999	Upgraded to SAP Version 4.0b
IT-3	2000	Go Live on SAP Human Resources Module
IT-4	2001	Upgraded to SAP Version 4.6c
IT-5	2002	Go Live with SAP at Poland Subsidiary
IT-6	2002	Converted Acquisition (HangCo) to SAP
IT-7	2003	Implemented SAP Business Warehouse
IT-8	2004	Upgraded to SAP Version 4.7

Appendix C-2: Episodes in IS Adaptation

Table 4: Episodes in IS Adaptation

"Alignment Factor"	Episode 1 – Developing an Infrastructure for Growth		
	Date Initiated	**Description**	**Trigger**
External Environment	Early Nineties and Continuing	Proliferation of Big Box Retailers (EE-1)	
	Mid-nineties and Continuing	Consolidation of Wholesalers (EE-2)	
Strategic Intent (Goals)	1995	Growth (SG-1)	Changes in Market Distribution Channels (EE-1)(EE-2)
Business Strategy/ Initiatives	1995	Development of Technology Infrastructure (SI-1)	Growth Strategy (SG-1)
Organization Structure	1995	Eliminated Divisional Structure and Moved to a Functional Matrix Structure (OS-1)	Development of Technology Infrastructure (SI-1)
	1995-1997	Consolidated Distribution from 15 to 4 Warehouses (OS-2)	Development of Technology Infrastructure (SI-1)
IS Strategy	1996	Maintain a Current Technology Infrastructure (IS-1)	Development of Technology Infrastructure (SI-1)
IS Structure	1997	Implemented SAP R/3 (IT-1)	Development of Technology Infrastructure (SI-1)

"Alignment Factor"	Episode 2 – Leveraging IS Infrastructure for Cost Savings		
	Date Initiated	**Description**	**Trigger**
External Environment	Late Nineties	Increasing Competition from Foreign Manufactures (EE-3)	
	1999	Buyback of Family-Owned Stock (EE-4)	
Strategic Intent (Goals)		No Change	
Strategic Initiatives	1998	Leveraging Technology Infrastructure for Cost Savings (SI-2)	Price Pressures (EE-1)(EE-2)(EE-3) and Buyout(EE-4)
Organization Structure		No Change	
IS Strategy	1998	No Change	
IS Structure	1999	Upgraded to SAP Version 4.0b (IT-2)	Initial IS Strategy (IS-1)

"Alignment Factor"	Episode 3 – Implementing eCommerce		
	Date Initiated	**Description**	**Trigger**
External Environment			
Strategic Intent (Goals)		No Change	
Business Strategy/ Initiatives	1999	Introduction of ePlumbCo (SI-3)	Up-to-date IT Infrastructure (IT-2)
Organization Structure		No Change	
IS Strategy		No Change	
IS Structure	2000	Go Live on SAP Human Resources (IT-3)	Initial IS Strategy (IS-1)
	2001	Upgraded to SAP Version 4.6c (IT-4)	Initial IS Strategy (IS-1)

"Alignment Factor"	Episode 4 – Growing Via Acquisition		
	Date Initiated	**Description**	**Trigger**
External Environment			
Strategic Intent (Goals)		No Change	
Business Strategy/ Initiatives	2002	Growth via Acquisition (SI-4)	IT Infrastructure (IT-1)
Organization Structure	2002	Acquired HangCo (OS-3)	Strategic Initiative for Growth Via Acquisition (SI-4) and Experience Converting Polish Sub(IT-5)
IS Strategy		No Change	
IS Structure	2002	Go Live with SAP at Poland Subsidiary (IT-5)	Acquisition Strategy (SI-6) and Acquisition of HangCo (OS-3)
	2002	Converted Acquisition (HangCo) to SAP (IT-6)	Acquisition of HangCo (OS-3)

"Alignment Factor"	Episode 5 – Innovating via New Product Development		
	Date Initiated	**Description**	**Trigger**
External Environment	2000	Increasing Regulation of Hazardous Materials Content (EE-5)	
	2002	Inflation in Raw Material Prices (EE-6)	
Strategic Intent (Goals)	2002	Updated SLRP: Growth, Lean, and MAX (SG-2)	
Business Strategy/ Initiatives	2003	Innovation via New Product Development (SI-5)	Continued Price Pressures (EE-6), Increasing Regulatory Requirements (EE-5) and New Strategic Goals (SG-2)
Organization Structure		No Change	
IS Strategy	2003	Focus on Content Delivery (IS-2)	Updated SLRP (SG-2)
IS Structure	2003	Implementation of Business Warehouse (IT-7)	Content Delivery (IS-2)
	2004	Upgraded R/3 to Version 4.7 (IT-8)	Normal Maintenance

Appendix D – PartCo Write-up

The purpose of this confidential report is to provide an overview of the information derived from research conducted at PartCo. It reflects aggregate findings based on all interviews and publicly available documentation. The report takes the form of a summary write-up of the company with a focus on the five-year period starting in 2000 and ending in 2004. This report is therefore a vehicle for sharing our understanding of PartCo, as well as a means for confirming the accuracy and completeness of our data collection.

The next step is for the researcher to learn from the interviewees if there are any errors or important omissions in this report. ***Feedback to the researcher from the primary contact at PartCo is therefore an important part of our research method. Please review the write-up and the attached documents for accuracy.*** We will set up phone interviews to capture your comments, and will then prepare a revised version of this report that can be distributed to all company participants.

Please note that the company name is used in this report. The purpose of this report is for your internal viewing only. Any academic documents that use this information will ***not*** contain the name of PartCo or any PartCo subsidiaries or brands without PartCo's express agreement in order to protect the confidentiality of the company. Please address any questions to Kerry Ward via email at kwward@indiana.edu or by phone at 812-340-4621.

Finally, we would like to express our gratitude to XXXX XXXXX, our principal contact, and the other PartCo participants.

Introduction

The purpose of this report is to describe the information derived from research conducted at PartCo. This report reflects information from interviews and other publicly-available sources such as the company web sites, practitioner publications, SEC filings, and Annual Reports. PartCo provided a unique opportunity to study the IS alignment process in an organization that had recently gone through a merger of equals. On-site interviews with ten employees were conducted at the XXXXXXXXXX and at the XXXXXXXX facility. The interviews were conducted during the fall of 2004 and inquired into the major events that have occurred in business and IS strategy and structure since the merger.

A brief overview of the company is provided based on current operations. Then a historical account of events important to understanding the alignment periods at PartCo is presented, focusing on their impact on the company's strategy, structure, and information systems.

Overview of PartCo

This section provides an overview of PartCo, including contextual information that led to the merger. The first section provides a current overview of the company. This is followed by information on the historical context of the industry and both companies leading up to the merger.

Current Company Overview

Headquartered in XXXXXX, PartCo is a publicly held company with $8 billion in annual revenues and is traded on the New York Stock Exchange under the ticker symbol PartCo. PartCo has a global presence with over 31,000 employees and 120 manufacturing facilities located in 25 countries. PartCo provides integrated systems, modules, and components for passenger, light truck, and commercial vehicles to the major automotive original equipment manufacturers (OEMs) and to consumers via aftermarket replacement products. PartCo is currently structured into three divisions: Light Vehicle Systems (LVS), Commercial Vehicle Systems (CVS), and Light Vehicle Aftermarket (LVA) (see Figure 1).

The largest division is the Light Vehicle Systems with $4.8 billion in sales for 2004. LVS employees over 17,000 people at 75 facilities in 23 countries. LVS supplies apertures (sunroofs and doors, etc.), undercarriage (suspensions and wheel systems, etc.), and air and emission systems (filters, mufflers, catalytic converters, etc.) to the leading automotive OEMs. Most new passenger vehicles and light trucks sold today include PartCo products. While LVS is the largest segment of PartCo, it is in a very competitive marketplace experiencing substantial change and continuous downward pressure on profit margins.

The Commercial Vehicle Systems (CVS) division provides drive train components and systems to the commercial vehicle market. CVS, with revenues of $3.2 billion, has 8,500 employees and 65 facilities in 19 countries. This market serves OEMs that produce commercial vehicles such as semi-tractors, buses and other medium or heavy-duty trucks and vehicles. While CVS is smaller in total sales than LVS, CVS has stronger profit margins and is viewed as a strategic asset for the future.

The Light Vehicle Aftermarket (LVA) division, with just under $1 billion in annual sales is the smallest division. LVA employees 5,000 at 21 facilities located in seven countries. LVA supplies replacement parts for passenger vehicles and light trucks to end consumers via automotive parts suppliers and other distributors. PartCo has several aftermarket brands that are well known including XXXXXXXX and XXXXXXXX. LVA is no longer considered a strategic asset and management has publicly indicated its intent to divest LVA.

Historical Context Prior to Merger

Because of its relatively short history, it is essential to understand the historical context of the two merged companies that evolved into PartCo. This section thus provides an overview of the history of PartCo prior to the period covered by the research. This includes a brief, high-level description of the automotive industry and the environment in which PartCo operates. An overview of the environmental context is followed by a discussion of the motivation for the merger and a brief overview of each of the merging companies.

The Environment

All interviewees classified PartCo's environment as dynamic citing three main reasons for this dynamism: 1) The relationship of the automobile industry to the U.S. economy; 2) Foreign automobile manufacturers have taken substantial market share from the U.S. manufacturers; 3) The automotive industry is heavily influenced by changes in government regulations.

First, the automobile market is cyclical and parallels the U.S. economy. When the U. S. economy is doing well, people buy new vehicles. Likewise, when the economy is

doing well, goods are moving, requiring more commercial vehicles to transport those goods. The alternative, however, is also true. When the economy is slow, so is the market for passenger and commercial vehicles.

The interviewees described the economic environment going into the merger as a down cycle. The U.S. economy was in recession and as expected, the automobile industry closely paralleled the U.S. economy. With the terrorist attacks on September 11, 2001, the recession was exacerbated and the economic environment continues to be difficult into 2005. The difficult economic environment contributed to the need for the merger by squeezing profit margins and reducing operating cash flow.

No specific changes identified in the strategies and structures of PartCo were specifically triggered by the poor economic climate. The impact appeared to make it more difficult for PartCo to move forward with the business strategies that were in place. In other words, the poor economic environment did not trigger changes, but it did hinder the ability to execute the strategies in place and slowed down the pace of structural change.

Second, the proliferation of foreign automobile manufacturers, particularly in the U.S. market, has increased the dynamism of the environment over the last 35 years. The U.S. automobile manufacturers faced little competition until the late 1970's. Prior to that period, the "Big Three" (General Motors, Ford, and Chrysler) were considered an oligopoly and dominated the U.S. market place.

The dominance of the Big Three led to a maturity, and lack of flexibility, that allowed the foreign automotive manufacturers to establish a foothold in the U.S. The maturity of the Big Three made it difficult for them to adapt and their foreign competitors were able

to compete on price and quality due to innovative manufacturing techniques and lack of constraints related to prior history and structure. For example, the Big Three, were constrained by substantial legacy costs due to well-established agreements with labor unions to fund pensions and health care for retirees. The foreign automotive manufacturers do not have the same legacy costs and thus have a lower labor cost. The foreign manufacturers also adopted a focus on continuous quality improvement introduced by Charles Deming, which the U.S. manufacturers were late to adopt, giving the foreign manufacturers a lead in quality.

Third, the regulatory environment impacts the automotive industry. In the U.S., the automotive industry is subject to several different regulatory influences. First, the Department of Transportation regulates automobile safety requirements and frequently mandates standards that the automobile manufactures are required to meet. Second, the Environmental Protection Agency influences the automotive industry via the regulation of emissions from fossil fuel engines and other environmental related issues. Third, federal labor regulations have a substantial impact on the automotive industry due to the large number of employees and the highly unionized work force.

Precession to the Merger

PartCo was created July 7, 2000 by the stated "merger of equals" of Company A, a $3 billion supplier of exhaust systems to the automobile industry, and Company B, a $4 billion supplier of drive-train, apertures, and other systems to the commercial and passenger vehicle markets.

The industry structure in which the two companies existed played a substantial part in triggering the merger of Company A and Company B. As noted, 35 years ago, the Big

Three dominated the automotive industry. At that time, they focused on vertical integration, with the OEMs owning everything from the vehicle design facilities all the way down to, in some situations, steel producers. Initially, the vertical integration allowed for lower manufacturing costs by eliminating middleman profits from the supply chain, and allowed the Big Three to control the process. As the industry evolved, and foreign competition put pressure on the Big Three, the benefits to vertical integration eroded.

Several factors contributed to the erosion of the benefits to vertical integration in the automotive industry. First, the management of this long supply chain proved difficult as the increased market competitiveness required flexibility to compete with the foreign manufacturers. The manufacturing of vehicles is a sophisticated process and innovation in continuous improvement and supply chain techniques pioneered by the foreign manufacturers such as "just-in-time inventory" required flexibility, a characteristic not designed into the tight vertical integration of the Big Three's supply chains. Second, owning multiple levels of manufacturing facilities tied up working capital that potentially could provide greater return if applied to other uses. Third, the unions had gained strength to the point that costs for the Big Three were no longer competitive with those of the foreign manufacturers. Each level of the supply chain represented another level of expensive unionized labor costs for the Big Three. In summary then, the extensive vertical integration of the American automobile manufacturers was too expensive and slow for them to compete with more nimble, leaner foreign manufacturers. The U. S. manufacturers divested the vertical integration, thus supporting the "tiered" structure of suppliers.

The increasing competition and innovation from the foreign auto manufacturers put continuous pressure on the Big Three to reduce costs, which the Big Three passed down to the tiered suppliers. The Big Three built into their contracts with the suppliers, price decreases for each year of the contract that required the suppliers to find ways to reduce costs. This approach put continuous pressure on profit margins, making it difficult for suppliers to be profitable. Additionally, the high labor costs of unionized labor led the Big Three to outsource not just manufacturing, but increasingly, the labor-intensive assembly processes. By pushing assembly to the suppliers, the Big Three reduced the amount of high-cost unionized labor incurred and pushed the union labor issues to the suppliers. The pricing pressure pushed firms not dependent on the automotive industry to exit the market. Firms that were dependent on the automotive industry were pushed towards consolidation. Company B's spin-off from Company BBB is representative of the former pressure. Company A's position prior to the merger is representative of the second.

Company BBB was a large multinational conglomerate with a presence in many industries, particularly government contracting, aerospace, and automotive. The return on investment in the low margin automotive supplier industry was not consistent with Company BBB's corporate goals. Further, Company BBB realized that profitability in the automotive industry required a focus on the industry that was not consistent with Company BBB's portfolio. In 1997, Company BBB spun off their automotive division to shareholders as a stand-alone company, forming Company B then focused on the automotive industry while the rest of Company BBB focused on more profitable industries.

The evolution of Company A followed a different route. Company A was an early supplier to the automotive industry, first supplying mufflers in 1927. Company A grew through product development and acquisitions to be a tier one supplier with the majority of their $3 billion in annual revenues being dependent on the automotive industry. Although it had grown into a larger company, it was still managed like a small one.

For companies such as Company A, already focused and dependent on the automotive industry, divestiture was not an option. The best strategy for Company A to survive was to become an even larger player in the automotive industry, leveraging their industry focus and expertise. Company A initially moved to increase their product portfolio and also began to assemble parts. The organic growth, however, was not enough to keep up in the consolidating automotive supplier market.

Looking at the situations of both Company A and Company B, there were good reasons to consider a merger. First, both companies were of similar size with Company B being slightly larger with around $4 billion in sales compared with Company A's $3 billion in annual sales. The size of each company independently made them relatively small players in the tier one supplier arena. Their relative size was a disadvantage in the current environment where the tier one suppliers were being taxed to provide more and more assembly and subsystems. Together Company A and Company B have almost $8 billion in annual sales, moving them into the top twenty automotive suppliers in terms of revenues. Although PartCo did not become the largest tier one supplier, the merger positioned the combined company to capture more of the business that was being consolidated among fewer players.

Second, there were synergies between the product lines of each company. Company B's primary products were in suspensions with the largest part of their products being related to the vehicle undercarriage such as brakes and axles, products not produced by Company A. Company A produced exhaust systems, a product line not produced by Company B, and had a shock absorber product line, which fit with the suspension products of Company B.

Third, the combined markets of Company A and Company B provided synergies. On the light vehicle side, Company A and Company B shared common customers. More important, Company B had a strong presence in the higher-margin commercial vehicle market including an existing distribution channel while Company A did not. Combining Company A's technical product knowledge of exhaust technologies with Company B's commercial market relationships and distribution channels therefore made strategic sense.

Finally, efficiencies were expected to be gained by reducing duplicate administrative overhead. For example, it was believed that the two companies' pension systems could be merged into a single program, eliminating administrative costs. This type of cost reduction was believed to be possible in multiple areas such as IT and Human Resources and was viewed by industry experts as necessary for companies to survive in the low margin, quick-changing economics of the automotive industry.

PartCo Company History (2000-2004)

This research covers a period of five years beginning with the merger in 2000 and ending in the fall of 2004, the time of data collection. The data collected from interviews and other documentary sources was coded into change events of significance that represent changes in the business unit strategies and structures and the information

systems strategies and structures over the five-year period. Each change event has been identified with the following codes, both in the text and in the tables: EE – External Environment, SG – Strategic Goal, SI – Strategic Initiative, OS – Organizational Structure, IS – IS Strategy, and IT – IS Structure. A list of each event by event type is presented in Appendix A.

The events were determined based on a compilation and review of all interviews and other documentary sources. The events are grouped into time-based episodes, demarcated by a change in PartCo's business strategy (goal or initiative). Each episode is summarized in Appendix B.

Episode 1: Merging Company A and Company B

The decision to consider the merger (EE-1) as the beginning point for the research period is based upon the consensus of those interviewed that the merger represented a new company. The merger was considered a merger of equals and as such, neither company was considered to exist in its prior form after the merger. The originating company and function of those interviewed varied, which would have made it difficult to isolate any one of the companies for a detailed pre-merger focus.

Prior to the official merger, extensive planning took place to ensure the merger's success and to minimize stress on the ongoing business of the merging companies. The merger team created an executive office to plan the merger that included high-level executives from both Company A and Company B. The executive office designed a plan to bring together the two companies over time, and without any initial major reorganizations or changes. The merger of the two multi-billion dollar companies represented a substantial risk of business disruption and there was concern that too much

immediate change would negatively affect the ability to conduct ongoing business operations and potentially cause the merger to fail. The initial changes were, therefore, focused on the elimination of redundant costs and on the integration of management and the basic infrastructure required to operate the merged company as one.

The first act of the merger plan was to reconcile the management structures. The new company could not run with separate executive branches; so agreements had to be reached at the highest levels as to who would take charge of which domains. The existing boards of directors from Company B and Company A consolidated to form a new board. The new board elected the CEO of Company B as the CEO of the combined company and named the CEO of Company A to the position of COO of the combined company. Similarly, the new board and executive officers assigned responsibilities for the rest of the high-level management structure.

The strategic goal for the merged company was to become the "supplier of choice for the global motor vehicle industry" (2000 Annual Report). Internally, a more succinct goal was stated; "to be the number one supplier to the automotive industry by 2010 (SG-1)." This was an aggressive goal. The combined revenue of approximately $8 billion placed PartCo in the middle of the pack in terms of their peer group, with total revenues far short of the industry leading, $29 billion, Delphi Corporation, the vertical spin-off of GM.

The new management established basic business strategies for the merged company focusing on growth either through internal growth of products and services or via acquisitions and joint ventures. The 2000 10K filed with the SEC outlines the following business strategies for the new company:

- Improve core business processes
- Capitalize on customer outsourcing
- Expand sales via higher value modules
- Leverage geographic strengths
- Increase sales to commercial markets
- Introduce new systems and technologies
- Expand the aftermarket business
- Pursue strategic opportunities (acquisitions, divestitures and other joint ventures and partnerships)

Immediately after the merger, however, the primary strategic initiative (SI-1) was on realizing cost savings from integration and elimination of immediate duplication in business processes. The merger plan targeted initial cost savings of $30 million during the first 100 days. Because the merger occurred in July, there was little time in 2000 for the company to focus on business strategy other than cost cutting from consolidation of the two companies. Substantial steps towards the implementation of the basic strategic initiatives outlined in the 10K, therefore, were not taken at that time.

At the time of the merger, management combined the prior structures of Company A and Company B under the new corporate management structure (OS-1). Company A's pre-merger organizational structure was divided into four divisions, primarily by product (see Figure 2). The exhaust technologies, Company A's core business, represented the primary division. The exhaust technologies division represented approximately 75% of Company A's sales and focused on OEM markets. Because of the focus on OEMs, the exhaust division was organized into three customer groups focusing on Ford, GM, and Chrysler. Company A's other divisions were much smaller. One division produced shock absorbers while the aftermarket division sold replacement parts to the end consumer through auto parts stores and other similar distributors. Company A had a

fourth division, ABC, which was a very small, but profitable, vertical specialty company that coated metal used in the making of automotive and other products.

Company B, at the time of the merger, was comprised of three divisions, structured around their end markets (see Figure 3). The heavy vehicle systems division manufactured and sold parts to OEMs that produced heavy duty trucks, buses, and other industrial and commercial vehicles. The light vehicle systems sold parts to OEMs that produced passenger vehicles and light trucks, while the aftermarket division supplied products to the end consumer through distributors for both commercial and light vehicles.

Immediately after the merger, the two companies were combined under one corporate umbrella, with few changes to the operational organizational structure (see Figure 4). All of Company A's exhaust technologies, including the aftermarket and the fledgling commercial vehicle exhaust technologies were placed under a Light Vehicle Systems structure with the Light Vehicle Group from Company B. Company A's exhaust technologies' customer focused grouping was abandoned for a product focus structure, a structure consistent with Company B. The consolidation of the Company B LVS group with the Company A exhaust technologies group was largely superficial. No functional or operational integration or consolidation of the two divisions occurred and the groups continued to act independently.

From the interviews and other documentation, it appears that the initial IS focus was on integration to reduce redundancies and costs. It is unclear, however, whether this approach was a formal IS strategy resulting from the merger or simply the resulting impact of the merger on the IS structure. Prior to the merger, it was stated that Company

A did not have a strategic view of IS and saw IS as a utility. Company B's strategic view of IS prior to the merger was not addressed by any of those interviewed.

The IS structure did require integration (IT-1); there were two IT infrastructures, with two incompatible email systems, two help desks, etc. It was not possible to integrate and manage the company as one with two separate IS infrastructures hindering communication, given the need to consolidate financial data for the merged entity. The elimination of the duplicate IT infrastructure also represented part of the expected cost savings of the merger. A single standard for email was selected, which moved Company B from Lotus Notes to Microsoft's Outlook, the standard used by Company A.

The other IS structural change that occurred within a few months after the merger was the discontinued use of J.D. Edwards (JDE) at the Company A divisions (IT-2). In 1995, five years prior to the merger, Company A made a decision to replace their aging legacy system. It was highly customized to the point where it could not be upgraded and management believed it would be difficult to continue running the company on the existing system. However, Company A did not view IS as a strategic asset and did not want to spend the money to implement an expensive system such as SAP. At the time, J. D. Edwards, an IBM AS400 based ERP targeting manufacturing, which did not have a presence in the automotive industry, approached Company A and IBM, suggesting a partnership. JDE offered Company A the JDE software at a substantially reduced cost, making the solution very attractive to Company A. Given that Company A was already heavily invested in IBM systems, using IBM mainframe, database and operating system, collaborating with J.D. Edwards and IBM seemed like the perfect solution.

Unfortunately, J.D. Edwards was unable to port the software to the IBM mainframe as initially promised by JDE, and IBM eventually dropped out of the partnership. J.D. Edwards provided Company A with an AS400 to run the software. Finally, late in 1999, Company A went live on the financial module. Approximately two months later, management announced the merger with Company B.

After the merger, the consolidated management decided to pull the plug on the JDE implementation. First, management was concerned with problems in the implementation of the financial module and therefore with the risk of implementing additional modules. Second, none of the Company B divisions were using JDE and the combined company's experience and knowledge with JDE was limited. Finally, the limited financial investment in the system made it easy to justify removing the recently implemented financial module. The Company A divisions rolled back the J.D. Edwards financial module and moved back on to Company A's legacy systems until the merged company could stabilize and management was ready to make a more informed decision as how to proceed.

Episode 2: Assembling Modules

During 2001, the second alignment episode was initiated by the execution of a strategic initiative to grow organically via expansion of the products and services offered to the OEMs. The primary focus of this initiative was to capture additional assembly processes outsourced by the OEMs and to increase "content per vehicle," that is the amount of PartCo product included in each new vehicle produced.

Historically, suppliers produced parts and shipped them to the OEMs. The OEMs then performed the assembly of the vehicle from parts provided by the tier one suppliers.

During the nineties, the trend was for suppliers to provide more of the labor component and to manufacture and assemble systems to leverage the suppliers' typically lower labor costs. For example, Company A originally manufactured mufflers and shipped them to the OEMs, which attached them to the vehicles on the OEM vehicle assembly line. Company A then extended its products to produce exhaust systems, which included mufflers, catalytic converters, and exhaust pipes, delivering the exhaust system to the OEMs, and not just mufflers alone. This evolution continued to expand the role for tier one suppliers such as PartCo as the OEMs continued to look for opportunities to outsource.

Combined with the desire of the OEMs to push more labor-intensive assembly down to the tiered suppliers and the desire for PartCo to become the number one supplier to the automotive industry, PartCo made a strategic decision to initiate assembly of modules (SI-2). This decision meant that PartCo moved from assembling systems from parts they manufactured to assembling entire sections or "modules" that included parts and components produced by other manufacturers. Hence PartCo needed to coordinate with the lower tier suppliers to assemble their own and third-party manufactured parts and components into completed modules. For example, PartCo moved from the production of the electric window assemblies from self-manufactured parts to the assembly of a door module that included audio speakers and other parts manufactured by other companies. PartCo assembles parts and components from multiple suppliers and provides a completely assembled door ready to be hung on the auto frame to the OEM.

A consequence of the move to module assembly is that the size of the modules makes them expensive to transport to the OEMs. This added transportation cost initiated a

structural change at PartCo. PartCo built small assembly plants close to the OEMs' final assembly plants (OS-2). PartCo coordinates the delivery of the parts they manufacture and the delivery of parts from third party manufacturers to their assembly plants. PartCo then assembles the individual parts and subassemblies into modules and transports the completed modules the short distance to the OEM final assembly plant.

In the summer of 2002, a major structural reorganization of the divisions occurred (OS-3). The reorganization consolidated the manufacture and assembly of parts and modules by market. One reason for the reorganization was the merger itself. As part of the merger plan to reduce operating costs, merging organizational structure reduced redundant overhead. A second reason was related to the move to modules.

Company A's exhaust technologies was merged with the light vehicle division of Company B to form the Light Vehicle Systems (LVS) division. Note that they were placed under the same umbrella of LVS at the merger, but left autonomous. The reorganization integrated the two into one division merging administrative, marketing, engineering, and other functions. The exhaust technologies and the products of the light vehicle division from the old Company B supplied products to the same customers and were strategically focused on the development of modules for OEM customers. The combined LVS division allowed for a single point of contact for the OEMs and made it easier to coordinate the design and engineering of modules. The restructuring facilitated the elimination of duplicate marketing structures and other overhead such as human resources and accounts payable, etc. The small piece of exhaust technologies that had been initiated to look at the commercial exhaust market prior to the merger was moved into the commercial vehicle systems.

A final piece of the structural reorganization was to move the light vehicle aftermarket segments of both Company A and Company B into one division. Again the common trigger was that both light vehicle aftermarket divisions have different distribution channels from those that provide products to OEMs, and efficiencies could be gained by grouping the two aftermarket segments.

The result of this reorganization was the creation of a commercial vehicle systems division, a light vehicle systems division, and a light vehicle aftermarket division (see Figure 4). The roll coater division was targeted for divestiture due to its lack of strategic importance to the current organization and was sold during 2003.

The strategic initiative to supply modules contributed to a change in IS strategy. Assembling modules from parts produced by PartCo divisions and by third parties required increased coordination and orchestration of production and inventory information. In order to support efficient tracking and transfer of parts among different plants and manufacturers, management realized the need for harmonizing the data (e.g. consistent part numbers, etc.) and standardizing processes and systems across the organization. This approach was referred to as a "convergence strategy" (IS-1).

Multiple systems were in operation throughout PartCo. The North American based Company A facilities were using a highly customized mainframe-based system centrally hosted at the Columbus facility. Company A's Europe based facilities were standardized on a manufacturing system referred to as AIMS, hosted in the Netherlands. The AIMS system did not include financial capabilities, requiring each of the European facilities to maintain separate financial systems. Company B's systems were more diverse. Company B had made several acquisitions and their philosophy on IS was to give the

subdivisions autonomy regarding the systems they used. It was apparent that maintaining the 25-30 different systems would be expensive to support and maintain and would hinder the ability to transfer and track manufacturing, inventory, and assembly information.

Management decided to standardize the systems and data, but not on one system. The CVS division of Company B, just prior to the merger, had successfully implemented the Oracle ERP suite. CVS was happy with Oracle, but it was expensive to implement and maintain. The cost was acceptable to CVS because the higher profit margins in the commercial markets allowed them to absorb the cost. On the LVS side, however, Oracle was not seen as a realistic solution because of the lower profit margins.

Prior to the merger, Company B had a few subdivisions that had successfully implemented a product called MFG Pro by QAD. Several of the tiered automotive suppliers used MFG Pro and it was considered close to a standard for the automotive industry suppliers. The fact that some of Company B's subdivisions had already implement MFG Pro meant that they knew it could be successfully implemented and PartCo had existing familiarity and knowledge with the implementation and use of the package. Management therefore decided to standardize on MFG Pro on the LVS side and on Oracle on the commercial side.

Episode 3: Meeting New Federal Emission Regulations

Environmental concerns about the emissions from fossil fuel engines have resulted in increasingly strict requirements on the processing and release of such emissions, particularly in the U.S. and the European Union. On December 21, 2000, the EPA signed into federal regulation strict new standards for diesel engine emissions (EE-2). The first

of these new standards take effect in 2007, with a second tightening of the standards going into effect in 2010. The new EPA regulation increases demand for emission conversion products to meet regulatory requirements. PartCo is well positioned to meet these requirements due to their expertise in emission technology, which reduces the amount of harmful elements in the exhaust. PartCo thus considers developing products to help the OEMs to meet the strict new EPA standards to be an important strategic initiative (SI-3).

Prior to the merger, Company A chose to ignore the commercial segment because of the differences between the light vehicle and commercial markets. Products for passenger vehicles and light trucks were mass produced in lots of hundreds of thousands while commercial vehicles were produced in much smaller numbers. Although there were a few common customers, in large part, the passenger vehicles and light truck OEMs were not the same as the commercial vehicle OEMs, requiring additional sales channels to market to the commercial vehicle OEMs. Company A management feared that the resources required to properly enter the commercial market could detract from the ability to remain competitive in their demanding core passenger vehicle business.

A few months before the merger, however, in light of the then proposed EPA regulations; Company A rethought its strategy and decided to investigate the commercial arena. Company A realized that not only are the diesel OEMs required to meet these standards, none of the commercial vehicles currently on the roads met this requirement and would need to be brought into compliance through retrofitting of the diesel engines currently in service. Company A's expertise in exhaust systems combined with the

higher profit margins in the commercial segment made the market sufficiently attractive for Company A to explore.

After the merger took place and the regulations were approved, the new emission standards took on an additional strategic importance to PartCo. As previously noted, the merger combined Company A's exhaust technologies and expertise with the existing commercial market channels of Company B. This combination put PartCo in a good position to take advantage of the demand for new diesel engine exhaust technologies.

An additional factor also reinforced the strategic importance of the new regulations and the position of PartCo to leverage the opportunity. When Company A was a stand-alone company, it produced over 75% of Chrysler's emission products. In 1998, Chrysler merged with Daimler-Benz to form Daimler-Chrysler. Daimler-Benz, however, received most of its emission products from a German Company, ZZZ.

ZZZ was a relatively small, family-owned company with approximately $450 million in sales, mostly to high-end, European-based automobile manufacturers such as Daimler-Benz, BMW, Volkswagen, and Volvo. ZZZ had a reputation as the top-quality producer and a technology leader in emission technologies in Europe. After the merger of Daimler-Chrysler was announced, a deal was struck for Company A to purchase 49 percent of Zeuna-Starker. This ownership helped to cement Company A's continuing role with Chrysler and to help Company A establish a relationship with Daimler.

Company A's investment in ZZZ took on added importance for PartCo in light of the new EPA emission standards. In Europe, the use of diesel engines in passenger vehicles, as well as commercial vehicles, is commonplace. ZZZ's reputation as a technology leader in the emissions arena included expertise in controlling emissions from diesel

engines. Recall that an important aspect of the PartCo merger was the ability to port Company A's emission technology to commercial vehicles, which frequently use diesel engines. In 2002, PartCo purchased the remaining 51 percent of ZZZ (OS-4) to become the sole owner of the diesel emission technology.

Episode 4: Attempting to Acquire WXYZCo

Given the disparity between PartCo's $8 billion in annual revenues and the $29 billion in annual revenue of its largest competitor, it is unlikely that internal growth alone could result in the growth necessary for PartCo to accomplish its strategic goal to be the number one supplier to the automotive industry by 2010. Recall, however, that one of the initial publicly stated strategic initiatives was to "pursue strategic opportunities," which included acquisitions, divestitures, and other opportunities. With the merger completed and stabilized, management became more focused on finding an acquisition (SI-4) to help them grow.

One such opportunity was presented by WXYZCO, a company quite similar to PartCo. WXYZCO was a tier one supplier to the automotive industry, which served the same segments as PartCo (light vehicles, commercial vehicles, and aftermarket). WXYZCO was slightly larger than PartCo from an annual revenue standpoint -- just under $9 billion. PartCo and WXYZCO combined, however, would be the seventh-largest supplier to the automobile industry. While still short of being the number one suppler, this would move PartCo from the top 20 to the top 10 with a further 7 years to achieve their strategic goal to be the number one supplier by 2010.

PartCo's first contact with WXYZCO was in 2001 when the companies entered into private discussions regarding a joint venture to combine the two companies' Aftermarket

divisions. The joint venture fell through. However, in early 2003, PartCo attempted to acquire WXYZCO. WXYZCO was opposed to the bid from the start, resulting in a hostile takeover attempt, which lasted several months. On November 24, 2003, PartCo withdrew its bid to acquire WXYZCO.

While the failed attempt at the merger did not result in changes to the organizational structure or information systems of PartCo, it is likely that the future direction of PartCo has been altered by the failed acquisition. It will be very difficult for PartCo to grow fast enough internally to become the number one supplier to the automotive industry in the remaining five years.

In early 2004, the CEO of PartCo announced his retirement and a new CEO from a former competitor was announced to fill the PartCo CEO position. At the time of this research, the impact of the new CEO was uncertain. It is suspected that the strategic goal will have to change because PartCo is unlikely to achieve its current strategic goal.

The new CEO faces a difficult environment. For the past two years, inflation has been a serious issue, putting even greater pressure on already tight profit margins. To this point, no strategic or organizational changes have resulted from the inflation. It is, however, an issue PartCo and the new CEO must deal with. Whatever the direction, the new CEO is highly regarded and everyone is universally enthusiastic about the future of PartCo.

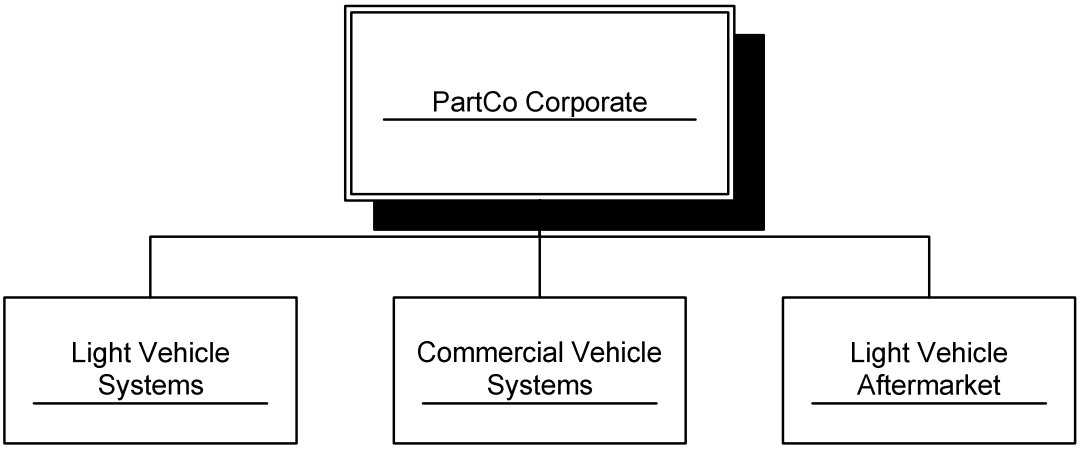


Figure 1: PartCo Current Company Structure

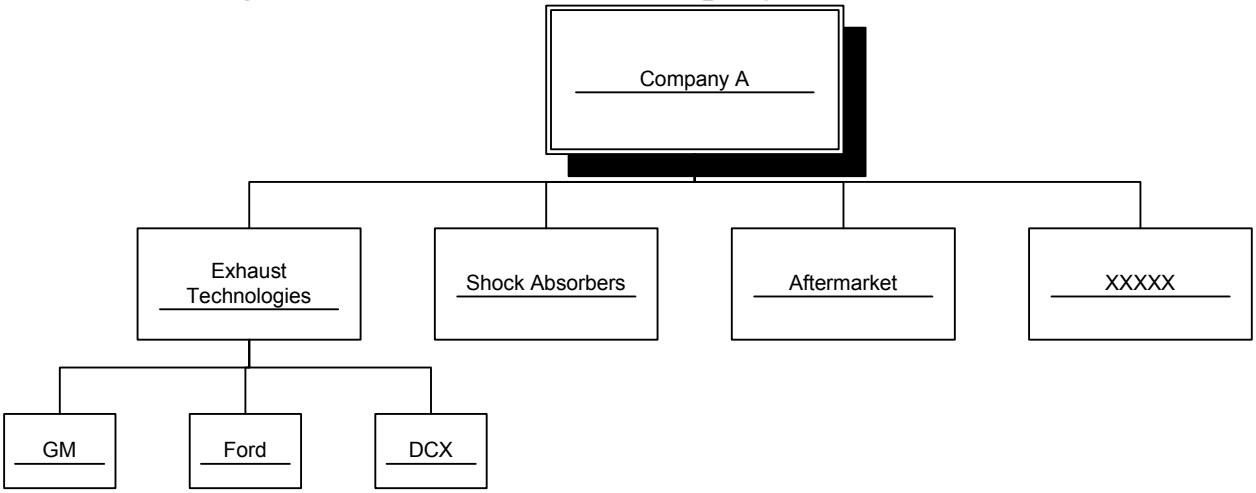


Figure 2: Company A Industries Corporate Structure

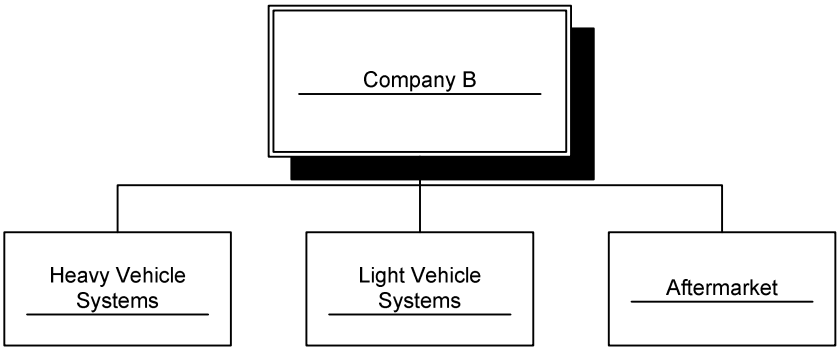


Figure 3: Company B Automotive, Inc. Corporate Structure (Pre-merger)

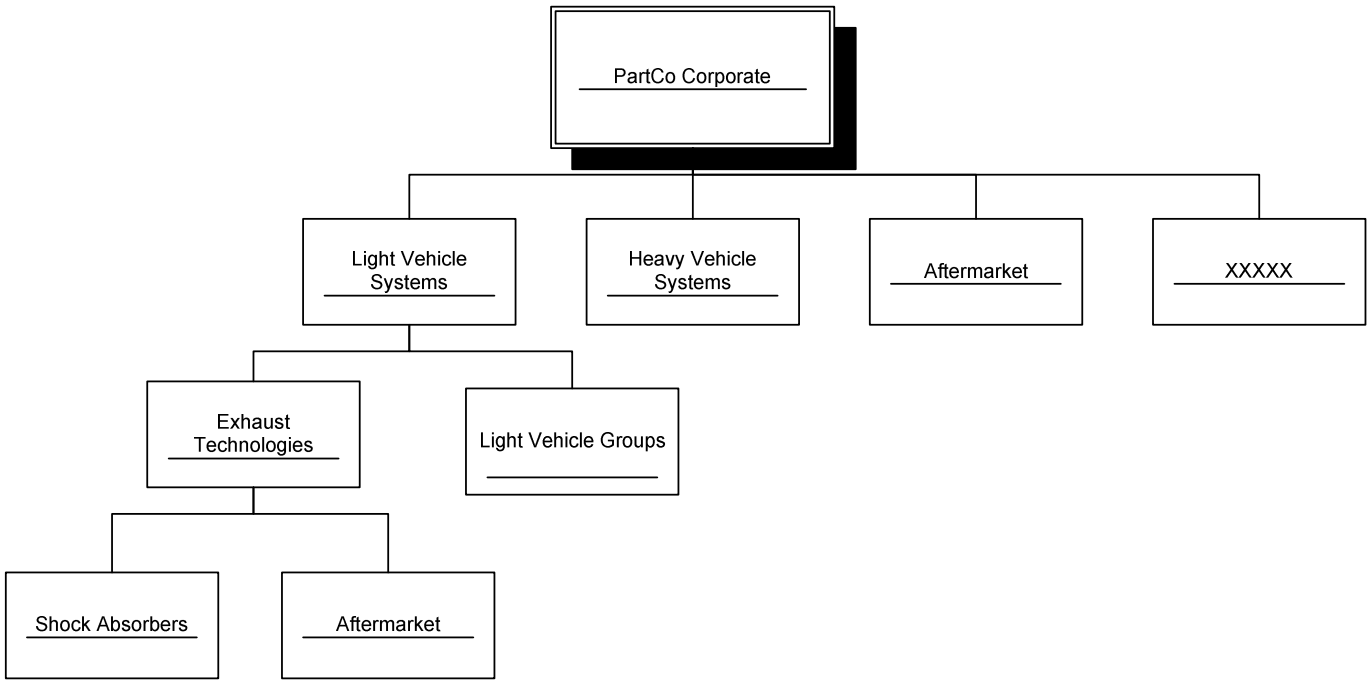
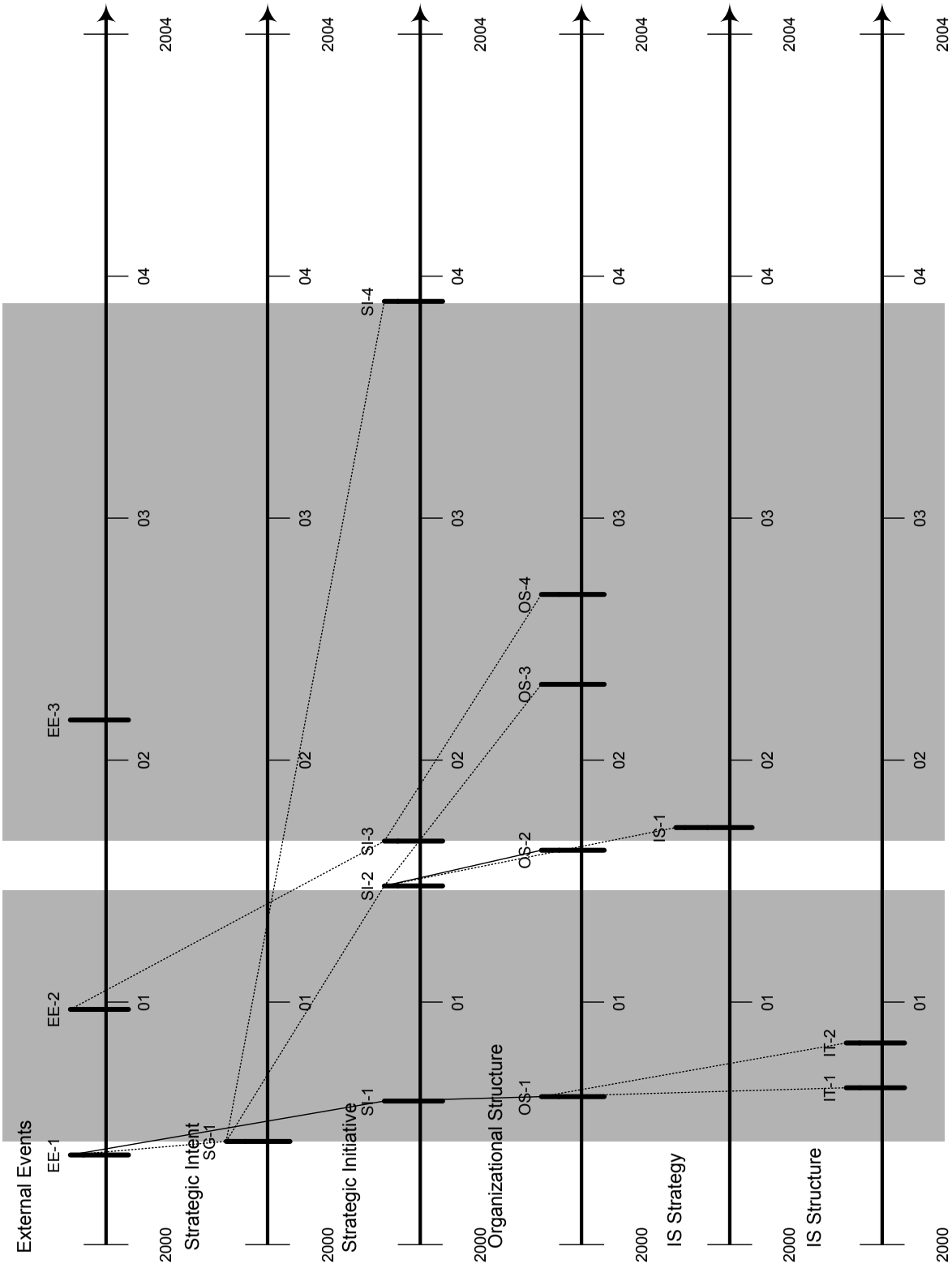


Figure 4: PartCo Corporate Structure Immediately Post Merger

Table 1: Definition of Events		
SG	Strategic intent (goals)	Changes in company goals
SI	Business strategy	Changes in strategic initiatives that represent significant changes in the way the company does business
OS	Organization structure	Changes in the way the organization is structured; defined as changes in organizational structure (as represented, for example, in the organization chart) or changes in significant management responsibilities
IS	IS strategy	Changes in strategic initiatives that represent significant changes in the way the company utilizes IS
IT	IS structure	Changes in IS structure and/or processes

Table 2: Event Timeline



Appendix D-1: Event Tables

Table 3a: Changes in The External Environment		
	Year**15**	Description
EE-1	2000	Merger of Company A Industries and Company B Automotive
EE-2	2000	Passing of New EPA Emission Standards to Take Effect 2007
EE-3	2002	Inflation in Raw Material Prices

Table 3b: Changes in Business Unit Strategic Intent (Goals)		
Label	Year	Description
SG-1	2000	Become the # 1 Supplier to the Automotive Industry

Table 3c: Changes in Business Unit Strategic Initiatives		
Label	Year	Description
SI-1	2000	Focus on Cost Cutting
SI-2	2001	Assembly of Modules
SI-3	2001	Development of Commercial Products for New Federal Emission Regulations
SI-4	2003	Failed attempt to acquire WXYZCO

Table 3d: Changes in Organizational Structure and Process		
Label	Year	Description
OS-1	2000	Merged Company A and Company B Management and Organizational Structures
OS-2	2001	Move to Market – Move Plants Next to OEM Plants
OS-3	2002	Reorganization of Structure to Three Divisions (Merged ET into LVS and Created LVS, CVS, and LVA)
OS-4	2002	Acquired Remaining Interest in ZZZ

15 The dates on the events are an approximation based on the combined interviews and review of publicly available data. In general there was a time lag between the time a strategic initiative was introduced at the corporate level and the impact or action taken at the division level. For example, the 2000 annual report introduced the strategic goal of being a dominant supplier to the automotive industry and mapped out strategic initiatives for reaching the goal. However, it was 2001 before the interviewees acknowledged the strategic initiatives.

Table 3e: Changes in IS Strategy		
Label	Year	Description
IS-1	2001	Convergence Strategy (Consolidation and Standardization)

Table 3f: Changes in IS Structure and Processes		
Label	Year	Description
IT-1	2000	Consolidation of IT Infrastructures
IT-2	2000	Removal of J. D. Edwards at Company A Divisions and Move Back to Legacy Mainframe System

Appendix D-2: Episodes in IS Adaptation

Table 4: Episodes in IS Adaptation

"Alignment Factor"	Episode 1 –Merging Two Well-Established Suppliers		
	Date Initiated	**Description**	**Trigger**
External Environment	2000	Merger (EE-1)	
Strategic Intent (Goals)	2000	Become the #1 Supplier to the Automotive Industry (SG-1)	
Strategic Initiatives	2000	Focus on Cost Cutting (SI-1)	Merger (EE-1)
Organization Structure	2000	Merged Management and Organizational Structures (OS-1)	Merger (EE-1)
IS Strategy		None	
IS Structure	2000	Consolidation of IT Infrastructures (IT-1)	Merger (EE-1)
	2000	Removal of J. D. Edwards at Exhaust Technologies Division and Move Back to Legacy Mainframe System (IT-2)	Merger (EE-1)

"Alignment Factor"	Episode 2 – Move to Assembly of Modules		
	Date Initiated	**Description**	**Trigger**
External Environment		None	
Strategic Intent (Goals)		No Changes	
Strategic Initiatives	2001	Assembly of Modules (SI-2)	Goal to be #1 Supplier (SG-1)
Organization Structure	2001	Move to Market – Move Plants Next to Customer Plants (OS-2)	Assembly of Modules (SI-2)
	2002	Reorganization of Structure to Three Division (Merged ET into LVS and Created LVS, CVS, and LVA) (OS-3)	Merger (EE-1) and Assembly of Modules (SI-2)
IS Strategy	2001	Convergence Strategy (Consolidation and Standardization) (IS-1)	Merger (EE-1) and Assembly of Modules (SI-2)
IS Structure		No Change	

"Alignment Factor"	Episode 3 – Meeting New Federal Emission Regulations		
	Date Initiated	**Description**	**Trigger**
External Environment	2000	Passing of New EPA Emission Standards to Take Effect 2007 (EE-2)	
Strategic Intent (Goals)		No Changes	
Strategic Initiatives	2001	Development of Commercial Products for New Federal Emission Regulations (SI-3)	New EPA Emission Standards (EE-2)
Organization Structure	2003	Acquired Remaining Interest in ZZZ (OS-4)	Develop Products to Meet 2007 EPA Requirements (SI-3)
IS Strategy		No Change	
IS Structure		No Change	

"Alignment Factor"	Episode 4 – Attempting to Acquire WXYZCO		
	Date Initiated	**Description**	**Trigger**
External Environment	2002	Inflation in Raw Material Prices (EE-3)	
Strategic Intent (Goals)		No Change	
Strategic Initiatives	2003	Failed Attempt to Acquire WXYZCO (SI-4)	Goal to be the #1 Supplier by 2010 (SG-1)
Organization Structure		No Change	
IS Strategy		No Change	
IS Structure		No Change	

Appendix E – MotorCo Write-up

The purpose of this confidential report is to provide an overview of the information derived from research conducted at MotorCo. It reflects aggregate findings based on all interviews and publicly available documentation. The report takes the form of a summary write-up of the company for the ten-year period starting in 1995 and ending in 2004. This report is therefore a vehicle for sharing our understanding of the motor company as well as a means for confirming the accuracy and completeness of our data collection.

The next step is for the researcher to learn from the interviewees if there are any errors or important omissions in this report. ***Feedback to the researcher from the primary contact at MotorCo is therefore an important part of our research method. Please review the write-up and the attached documents for accuracy.*** We will set up phone interviews to capture your comments, and will then prepare a revised version of this report that can be distributed to all company participants.

Please note the company name is used in this report. The purpose of this report is for your internal viewing only. Any academic documents will ***not*** contain the name of MotorCo or of MotorCo without MotorCo's express agreement in order to protect the confidentiality of MotorCo and the MotorCo. Please address any questions to Kerry Ward via email at kwward@indiana.edu or by phone at 402-554-3369.

Finally, I would like to express my gratitude to XXXX XXXX, my principal contact, and the other MotorCo participants.

Introduction

The purpose of this report is to describe the information derived from the research conducted at MotorCo. This report reflects the information from the interviews and from other publicly available sources such as the company web sites, practitioner publications, SEC filings, and Annual Reports. The MotorCo provided a unique opportunity to study the alignment process in a division of a Fortune 500 company known for its business-technology innovation.16 On-site interviews at the XXXX headquarters were conducted with ten employees of the motor division. The interviews occurred in September 2004. A brief overview of the company is provided based on current operations. Then a historical account of events important to understanding the alignment episodes at the motor company is presented, focusing on their impact on the motor company's strategy, structure and information systems.

Current Overview of MotorCo Corporate and MotorCo

MotorCo is a Fortune 500 global conglomerate that provides a variety of solutions for industrial, commercial and consumer markets. Headquartered in XXXX, MotorCo is a publicly held company, listed on the New York Stock Exchange under the ticker symbol XXX. Founded 114 years ago, MotorCo Corporate grew through diversification via acquisitions and new product development. Today, MotorCo Corporate is a global leader in manufacturing and marketing of electrical, electromechanical and electronic products and systems with 245 plants located around the world. MotorCo Corporate has a presence in 150 countries focusing on emerging markets, such as Asia-Pacific, and

16 MotorCo was recently ranked second on InformationWeek's Annual List of the Top 500 Business –Technology Innovators (*InformationWeek*, Sept. 20, 2004, Issue 1006).

employs 107,800 people worldwide. Taking a conservative, but innovative management approach, MotorCo Corporate has steadily grown to over $15 billion in annual revenues.

Currently, MotorCo Corporate is separated into five business segments17: Process Control, Industrial Automation, Electronics and Telecommunications, HVAC, and Appliances and Tools (see Figure 1). MotorCo Corporate's structure is market-focused to leverage its brand name with eight brand platforms. These brand platforms are Process Management, Network Power, Climate Technologies, Industrial Automation, Appliance Solutions, Storage Solutions, Professional Tools, and Motor Technologies. Note that the detailed organizational structure is considered confidential, therefore the information provided in this case write-up is an approximation of the corporate structures based on publicly available information and the interviewees.

This research focuses on the MotorCo located within the XXXXXXXXXXXXX segment representing the Motor Technologies brand platform. MotorCo (MC) is one of over 60 divisions of MotorCo Parent. It produces a variety of electrical motors used in appliances, HVAC equipment and other products. These motors range in size from small, fractional horsepower motors to the largest industrial and commercial electrical motors produced today. These motors sell under a variety of brands including: XXXXXXXXXXXXXXXXXX.

The motor division is the cornerstone of the global corporation. MotorCo began when XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX. The company was successful from its inception and has grown and diversified to become the world's largest producer of electrical motors. MotorCo's innovation and engineering skills have kept

17 XXXXXXXXX

them at the forefront of the electric motor industry and today MC produces over 300,000 electric motors a day.

Today, the maturity of the product and ability to mass produce the motors has resulted in electric motors becoming a commodity with low profit margins. The interviewees characterized the environment for MC as dynamic over the last ten years. Economic fluctuations and increased competition led to further commoditization of electric motors putting pressure on costs, profitability, and market share.

Company History for Period Covered by Research (1995-2004)

This research covers a period of ten years starting in 1995 and ending with 2004. The data collected from interviews and other documentary sources was coded into change events that represent changes of significance in the business unit strategies and structures and the information systems strategies and structures over the ten-year period. Each change event has been identified with the following codes, both in the text and in the tables: EE – external environment, SG – strategic intent (goals), SI – strategic initiative, OS – organizational structure, IS – IS strategy, and IT – IS structure. The events were determined based on a compilation and review of all interviews and other documentary sources.

The events are grouped into time-based episodes. A change in the motor company's business unit strategy demarcates episodes. Because this research focuses on the motor company division, changes that occurred at the corporate level are considered to have occurred in the external environment of the motor company division and are thus coded as external environment events (EE). Events are listed by date of occurrence in Appendix A. The episode write-ups provide a more integrated discussion based on the strategic

events of the motor company and therefore, the appearance of the events, particularly events related to MotorCo Corporate are integrated with their impact on the motor company and may not, therefore, appear in chronological order as presented in Appendix A.

Prior to the First Episode: Continued Record Setting Performance

The first episode of this company write-up represents the period from 1995 to 1996. This episode represents the initial period from the date first covered by the research to the time of the first strategic change at the motor company. There was no change in MC level strategy that triggered this period. Episode 1 provides an overview of MotorCo Corporate and the motor company at the start of the research up to Episode 2 when the first change in motor company strategy occurred.

MotorCo Corporate

As MotorCo Corporate moved into the ten-year period covered by this research, the company was extending a long period of record setting growth and profitability. The success was fueled by international sales, which increased 35% during 1995 to account for over 44% of the total revenues. Net income also reached record levels to over $900 million in 1995.

The success of MotorCo Corporate was consistent with their strategic goals of creating shareholder value by focusing on growth, with a secondary focus on profitability via cost reduction. To accomplish their growth objectives, MotorCo Corporate had several strategic initiatives in place that focused on new product development, targeted acquisitions, and international sales. Since 1983, MotorCo Corporate has used a “best cost” strategy to support the cost reduction goal. The best cost strategy focused on

providing high quality products at the lowest possible cost, placing a constant pressure to increase quality, efficiency, and to reduce costs.

Structurally, entering the ten-year period, MotorCo had two business segments: Commercial and Industrial Components, and Appliance and Construction-Related Components (see Figure 2). MotorCo Corporate's focus on growth resulted in numerous acquisitions and the company structure had evolved to the point where there were 64 divisions operating largely as 64 separate companies. Each division was largely autonomous with different brands, ways of doing business, and information technology infrastructures. The only demands corporate placed on the divisions were financial in nature, requiring each division to present standardized, aggregate financial data to corporate.

MotorCo Corporate placed little focus on information technology entering into this ten-year period. Due to the autonomous nature of each division, MotorCo Corporate did not interfere with each division's selection and use of technology. Each division was free to implement whatever information systems they determined would best meet their divisional needs.

MotorCo

At the start of the ten-year period, the motor company (MC) enjoyed a competitive advantage based on its cost/quality ratio. The motors they produced were similar in price to those of other manufacturers, but few other manufacturers could meet the quality and reliability of MotorCo's motors. As a result, MC enjoyed strong relationships with its customers, a significant portion of which were OEMs that required highly reliable motors to place into consumer products such as household appliances and power tools. This

competitive advantage was a result of the best cost strategy initiated by corporate in 1983 and adopted by the motor company (SI-1).

Structurally, the manufacture of electric motors was dispersed throughout the MotorCo organization (again, see Figure 2). Electric motors used for industry and heavy commercial applications were produced under the Commercial and Industrial Components segment, while small fractional electric motors such as those used in household appliances and tools were manufactured under the Appliance and Construction segment. The Appliance and Construction business segment of MotorCo produced the largest number of electric motors.

The Appliance and Construction business segment included two motor divisions: specialty motors and air-moving motors. XXXX, a manufacturer of large industrial and commercial motors, and the hermetic motors division, which produced sealed electric motors, were separate from the other electric motor divisions but were still located under the Appliance and Construction business segment. XXXX and the hermetic motors division were autonomous business groups that operated with little or no divisional level influences. XXXX was autonomous because the size and nature of the large electric motors lent itself to continued autonomy after it was acquired. The hermetic division was largely tied to an internal customer, a division that manufactured compressors, and was therefore more closely associated with the compressor division than with the specialty or air-moving divisions.

Consistent with the overall view of technology at MotorCo, technology up to this point was less strategic and more transaction oriented for the motor divisions. Information systems were largely viewed as an overhead cost to be controlled and not as

a strategic asset. Each motor division had their own legacy systems. Acquired divisions, such as XXXX, brought their existing legacy systems into the technology mix while the preexisting divisions' systems evolved based on individual needs, independent from any direct corporate influence.

The period between 1995 and 1996 was a period of stability for the motor company. The economic environment was stable and strong. The market for motors, although considered mature in the U.S., was stable with few threats to MC's dominate market position. Sales in foreign markets were strong and growing and MotorCo was the world's largest producer of electric motors.

Episode 1: Initiating an eBusiness Strategy

By 1996 the development and proliferation of the internet was generating a lot of attention (EE-1) and there was speculation in the business community about how the internet was going to impact the business environment. The speculation focused on how the internet would impact the way a business interfaced with its customers and how the internet would impact the efficiency of markets. The primary concern for MC was the potential the internet represented for reducing profit margins in an already low margin industry.

In response, the motor company undertook an ebusiness strategic initiative to explore the impact of the internet on the motor company (SI-2). This ebusiness initiative was tasked with positioning the motor company to take advantage of any changes by developing an ebusiness strategy. A group of people were selected and tasked with not only identifying how the internet would impact the motor company, but also ensuring that

the motor company was ready for any changes that the internet might bring to the marketplace.

The ebusiness initiative did not immediately impact the organizational structure. There was, however, a change in the organizational structure related to the best cost strategy (SI-1) during this period. The motor company moved plants to Mexico to take advantage of lower costs (OS-1). Prior to this, MC had moved plants from urban areas to rural areas of Arkansas and Mississippi where labor and other costs were lower. With the best cost strategy, it was a natural progression for MC to move plants to Mexico where they could access even lower cost labor than in the rural areas of the states.

Neither the ebusiness strategic initiative nor the placing of plants in Mexico had a direct effect on MC's information systems. The impact of these events on the information systems, however, may have been mediated by Y2K concerns (EE-3). The potential inability of information systems to function after the conversion to the year 2000 was of great concern to the business community during the late nineties. The risk of catastrophic failure required businesses to ensure their systems were ready for Y2K. MC was no exception and for a two year period (1998 to 2000) MC's IS strategy was to prepare their systems for Y2K and to ensure they were Y2K compliant (IS-1).

In planning for Y2K there had been discussions about whether existing systems should be replaced, but the consensus was to make sure that their existing systems worked before confounding the problem with new system implementations. Note, however, that due to the degree of divisional autonomy, there were some exceptions to this approach among the different divisions that manufactured electric motors. Both XXXX and the hermetic motor divisions chose to replace aging legacy systems with

XXXX implementing J.D. Edwards and the hermetic division implementing Fourth Shift ERPs.

Episode 2: Focusing on End Customer

After Y2K, MC moved forward with a strategic initiative to focus on the end customer (SI-3), an initiative first introduced at the corporate level during the late nineties. The corporate level initiative was driven by management's concern about the corporation's ability to meet its primary strategic goal of growth. Although MotorCo was experiencing substantial growth in foreign markets, the majority of sales were still focused in the U. S. where the mature market and MotorCo's corporate structure were limiting growth.

Corporate was receiving feedback from customers that MotorCo's organizational structure was difficult to do business with. Because of the high degree of autonomy of the divisions, each of MotorCo's divisions maintained their own marketing and sales forces. Large customers doing business with multiple divisions of MotorCo had to deal with separate sales representatives for each division. Likewise, the autonomy of the technology meant that each division generated separate invoices that could not be combined or consolidated, resulting in companies receiving multiple invoices.

For example, a washing machine appliance manufacturer that purchases electric motors from MotorCo may also purchase controller assemblies and timers from MotorCo to be used in the same washing machine. Each of the products comes from an autonomous division and the manufacturer receives three different invoices for the three different products. If the manufacturer wants to design a new washing machine, the design has to be orchestrated with three separate divisions, complicating product design.

The customers (manufacturers) wanted a single point of contact, one person, one engineering contact, one invoice, etc. This autonomous corporate structure created a high transaction cost for customers and, as a result, low switching costs for each MotorCo product.

MotorCo management also realized that this structure constrained growth by limiting cross selling of products. There was no collaboration or cooperation among the divisions in terms of marketing and market coordination. Customers doing business with one division may not be aware of additional products and services other MotorCo divisions could provide. If a manufacturer purchased motors for use in their washing machines, but not the controls and timers, there was no way for the timer division or the control division to know that a potential customer for their products was already using MotorCo electric motors, or vice versa.

Management's response was to introduce a strategic initiative at the corporate level to expand the relationship with existing customers (EE-2). The purpose behind the shift in strategy by MotorCo's management was to enable growth by making it easier to do business with MotorCo. Management announced initiatives to move towards a "solutions" approach. The solutions strategy focused on markets as oppose to products. The idea was to approach customers with bundles of MotorCo's products and services that help the customers solve problems, not just sell the customer products. Corporate management planned this corporate initiative as more of an evolutionary shifting of strategy and structure that occurred over a three year period, rather than a radical change that occurred all at once.

To further support this approach, MotorCo announced integration across the divisions and business segments to present a "single face to the customer." The changes were designed to increase the number of products MotorCo could provide to each customer, leveraging MotorCo's size and product portfolio. This integration across divisions was extended during 1998 when, MotorCo Corporate introduced a focus on three primary vertical markets: process industries, power generation, and telecommunications. Management also announced a formal branding strategy to identify with MotorCo Corporate, the multiple autonomous products and brands under the MotorCo product portfolio. This branding strategy was designed to broaden product awareness of MotorCo's existing customers.

It was at the same time as MotorCo Corporate was making these strategic changes that MotorCo first publicly acknowledged information technology as being of strategic significance to MotorCo(EE-4) by stating that technology and ecommerce could help in "communicating the value of MotorCo's products and services to customers (XXXXXXXX)." MotorCo announced the development of a technology road map to identify technology areas of strategic significance to the firm and announced the development of a company-wide procurement system to leverage the consolidated buying power of MotorCo.

The announcement signaled a subtle, but important shift in the corporate view of how to manage MotorCo as a corporate entity. Corporate management was indicating that they were looking beyond divisional autonomy to leverage corporate level efficiencies and the corporate-wide procurement systems signaled a willingness by corporate to consider centralization of certain tasks.

MotorCo corporate continued the strategic evolution and repositioning initiatives and during 1999, they reorganized the corporate structure (EE-5). They eliminated the two existing business segments, Commercial and Industrial Components and Systems, and Appliance and Construction Related Components, to reflect the current strategic focus on end markets and bundled products and services. Five new business segments were established: Process Control, Industrial Automation, Electronics and Telecommunications, HVAC, and Appliances and Tools (see Figure 1). The motor company was aligned under the Appliance and Tools division.

Management also created eight distinct product groups or brand platforms for purposes of targeting the solutions concept to specific markets. As mentioned in section 2, these brand platforms are Process Management, Network Power, Climate Technologies, Industrial Automation, Appliance Solutions, Storage Solutions, Professional Tools, and Motor Technologies. MC's products largely fall under Motor Technologies brand platform, but MC's products are cross sold under most of the other brand platforms as well.

It was also during this episode that MotorCo Corporate recognized that a global company required a global IT infrastructure. This realization combined with the need for a strong technology infrastructure to support the company-wide procurement systems and the need to control costs in a difficult economic environment, prompted MotorCo management to centralize corporate-wide internet connectivity (EE-6).

Prior to corporate's new initiative, each division, consistent with the prior divisional autonomy, had initially set up its own internet access, IT infrastructure, firewalls, virus protection, and other internet-related technology. Each division maintained separate

support staffs to take care of the infrastructures. This divisional autonomy created unnecessary redundancy and caused difficulty in communicating across incompatible systems and standards. MotorCo thus established the Internet Connectivity Services unit. The Internet Connectivity Service unit provided a standardized internet access that increased the ability to communicate across the corporation and reduced costs.

The employees at the MC level did not indicate a business unit impact of the corporate level strategy shift and restructuring until 2000. It is not clear why the change at MC did not occur when MotorCo announced the initiatives at the corporate level. It is possible that Y2K tied up so many resources that other changes were not made until after Y2K. It is also possible that there is simply a normal time lag between the initiation of a corporate level strategic initiative and the impact of that initiative at the business unit level.

During 2000, in response to the strategic initiative to focus on the end customer (SI-3) MC reorganized the motor company structure (OS-2). The motor division was reorganized to form the commercial industrial motors division (CIM). The reorganization combined the specialty motors division, air moving motors division, hermetic motor division, and XXXX into a single umbrella organization with three subdivisions underneath it: air moving, specialty, and industrial solutions (see Figure 3). The three new subdivisions represented three primary end markets served by the motor company.

An additional benefit of the restructuring was that grouping the manufacturing of similar items led to cost reductions. Although the different types of motors varied in the way they were manufactured and in the size of production runs, there was a lot of

similarity in the manufacturing process, the material used, the engineering, and other overhead.

A second change to the organizational structure during this same time was the move to "off-shoring" of manufacturing (OS-3). This structural shift was driven by the best cost strategy. Off-shoring is the purchase or manufacture of parts, components and, potentially, complete products in foreign locations where there are substantial cost advantages. For example, the manufacturing of a product can be contracted to foreign factories for less than the motor company can manufacture the product in its North American plants. Off-shoring supports best cost because quality can be maintained and the product can be produced at a lower cost.

As an alternative to contracting out the manufacturing, another trend in off-shoring is for U.S. companies to build their own plants in these low cost countries, further leveraging the lower labor and production costs. MC established plants in Asia in order to compete with the cost structures enjoyed by the foreign manufacturers. The motor company also, at the invitation of its customers, built plants next to the plants of its customers (OEMs, for example). This provided lower transportation cost benefits and further integrated MC's product into the customers' supply chain, increasing switching costs.

During 2000, in response to the 1997 initiative to look into the strategic value of the internet (SI-2), MC established a formal ebusiness group (OS-4). People were taken from both the IS side and the business side and located together to share technology and business knowledge. There were a lot of potential projects so the ebusiness group

prioritized the projects and, working with an ebusiness steering committee, focused on the highest priority projects.

Episode 3: Reducing SG&A Costs

In the aftermath of Y2K, there was a substantial reduction in technology spending that triggered a crash in the technology industry. This crash ended a long cycle of economic expansion and preceded a recession in the U.S. economy (EE-7). The technology crash and recession had a major impact on MotorCo. The telecom business segment, which had become the largest business segment over the prior two years, saw sales fall dramatically. During fiscal 2001, for the first time in 43 years, MotorCo Corporate failed to increase earnings. Sales, cash flow and return of capital all decreased after lengthy periods of record setting results (see Table 1). The recession resulted in a difficult environment for all of MotorCo's business segments including MC. Specifically, for MC, the U.S. recession resulted in lower sales in their primary U.S. market.

Compounding the impact of the recession on MC, the foreign manufacturers were improving their product quality. By 2000, not only were the foreign competitors able to provide lower prices, they also were able to meet MC's quality, offering a similar quality product with a lower cost (EE-8). This posed a threat to MC, not only to their ability to grow in foreign markets, but also domestically where MC had a dominant market share and had previously faced little competition.

The environmental stress triggered a shift in the strategic goals of the motor company. Prior to this, and consistent with MotorCo corporate level strategy, MC's strategic goals had focused on growth with a secondary focus on profitability. With the low growth in

the U.S. market, recession, and increased foreign competition, growth was increasingly difficult to achieve and there was downward pressure on price. Management at the motor company shifted the focus to profitability via cost reduction (SG-1) to counter the environmental threats. Growth was not abandon as a goal; it was just viewed as secondary to the primary goal of being profitable.

During 2001, and triggered by the shift in strategic goals, the motor company enacted a strategic initiative to shift focus from reducing cost of goods sold to reducing the selling, general, and administrative costs (SG&A) (SI-4). SG&A costs represent the non-manufacturing costs of doing business and include overhead costs such as information technology, marketing, and administration. In the past, the search for cost cutting at MC focused on reducing the costs in the manufacturing process; for example, reducing costs in raw materials, reengineering products to reduce the amount of raw materials used, finding lower cost alternative materials, or developing more efficient manufacturing techniques. Management was concerned that the best cost strategy had already leveraged the cost of goods sold and thought few big opportunities remained for reducing these costs further. Management decided instead to focus on an area not targeted for cost cutting in the past – SG&A costs.

A key to implementing cost cutting in SG&A was centralization which was enabled by the reorganization of the motor company (OS-6) and the centralization of the internet at the corporate level (EE-6). By combining the multiple divisions into CIM, the motor company was able to pull out redundant overhead costs duplicated in each autonomous division, and centralize them under CIM. For example, by centralizing travel services via the internet, MC eliminated services duplicated at each division, reducing head count and

other related overhead costs. Employees, instead of having someone at their division search and book travel plans, simply access a central service via the internet and, using a portal, access the service 24 hours a day from anywhere in the world, in effect, increasing the level of service and lowering the cost.

Another avenue for reducing SG&A cost was outsourcing (OS-5). Following a popular trend, MC investigated outsourcing and believed outsourcing held the potential to significantly reduce SG&A costs. MC first outsourced engineering to lower cost locations in India and China. This allowed more expensive services in the US to be replaced with lower cost services, reducing SG&A costs. The outsourcing of engineering was successful and MC moved to outsource IS functions and other SG&A costs.

Communicating around the globe with multiple languages, time zones, and cultural differences as required by outsourcing, is complex, requiring a substantial technology infrastructure. The centralized, global, IS infrastructure created by the centralized internet access allowed 24 hour access to engineering information by people in the US, Asia, and India. Without the technology, the outsourcing would not have been possible.

The benefits and success of cutting SG&A cost by leveraging centralization such as corporate-wide internet access prompted the continuation of centralizing of information systems and ultimately the development of IT Shared Services (EE-9) at the corporate level. The first step toward more IS centralization was the selection of a standard software suite for web development. A corporate-wide committee formed with representation from multiple divisions and tasked with selecting software and establishing processes for web development. The committee negotiated, as a $15 billion company, with the software vendor for corporate-wide access to web development

software. Whereas before, the smaller divisions did not have access to the more sophisticated and expensive technology, by moving to corporate wide shared IT services, the smaller divisions could afford the more sophisticated technology and total cost was reduced.

The focus on centralization to reduce SG&A costs and creation of IT Shared Services directly affected the motor company. The strategic focus of information systems shifted to centralization and the leveraging of corporate resources (IS-2). More services and overhead tasks moved from the motor company level to a corporate-wide level. As noted, the web presence for the motor company divisions consolidated under corporate directives and additional services such as web conferencing and employee portals were supported at the corporate level. This required the shifting of personnel and IS resources away from the division level to the corporate level shared services (IT-1).

MotorCo built upon the success and cost savings from the IT Shared Services by negotiating with Oracle for a corporate-wide license making Oracle the sole ERP vendor for the entire organization (EE-10). A group was formed with the primary purpose of implementing Oracle throughout the motor company (IT-2).

There were several advantages to this corporate-wide standard Oracle suite. First, the investigation and selection process for a new enterprise system is costly unto itself. Documenting “as is” and “to be” processes, determining requirements, and comparing different vendors is a costly and time-consuming process. The mandated corporate standard eliminated this package selection process. Second, implementing a new system requires substantial organizational learning. The corporate-wide standard and permanent implementation group allows MotorCo to learn from each implementation and to apply

that knowledge to the next implementation, making future implementations more efficient and effective. Third, maintaining multiple data centers is expensive. Implementing a single suite allows MotorCo to reduce the number of data centers reducing costs. Finally, the fewer software instances simplify issues of security and disaster recovery, by minimizing the numbers of backups.

The selection of Oracle as a corporate standard did not dictate that divisions had to adopt Oracle. Instead, the corporate mandate was to eliminate the choice for divisions who decided to replace their legacy ERP system. A division did not have to move to Oracle, but if they decided they needed to move from their existing systems, they needed strong justification for choosing a route other than Oracle. The division would also have to bear the additional expense, which would likely dissuade most divisions from implementing anything but Oracle.

During this period, a number of business scandals resulted in increased government regulation (EE-11). Specifically, congress passed the Sarbanes Oxley Act (SOX) of 2002 increasing the reporting requirements of publicly held corporations. SOX included documentation on system security and increased system auditing requirements. Increased system auditing requirements, in turn, impacted the motor company's information systems. It altered the way the systems were structured and documented in order to provide increased transparency to transactions (IT-3). The business strategy did not change, nor did the IS strategy, only the IS structure and processes were impacted because the additional external regulatory requirements increased the need for security and documentation for information assurance.

Additional restructuring of CIM occurred during 2004 (OS-6). The CIM group was subdivided into four business units: ventilation, HVAC, industrial, and fluids. The purpose of the reorganization was related to the objective of better aligning products to customer segments and branding. The hermetic and appliance divisions are very different from the larger (interval) motors in terms of the markets. Hermetic and appliance divisions sell directly to OEMs. There are only a few major OEMs and they have sophisticated demand forecasting capabilities. The major OEMs require standardized motors that are mass-produced. Interval motor sales, on the other hand, are manufactured on a per order basis for a large number of customers, with greater product customization. The larger number of customers making smaller orders makes it difficult to forecast production scheduling. The larger number of customers also requires a different distribution channel, mainly the use of wholesalers and distributors to aid in reaching the end customers.

A second objective of the current reorganization of CIM was to provide better accountability for profit and loss. A stated corporate level initiative tied to the strategic goals is to make selected divestitures of product lines that are not as profitable as desired or that are not able to meet the growth goals of MotorCo. This reorganization will aid in the evaluation of the product lines by providing a stronger focus on product line profitability.

Information systems are proving to be a difficult issue for the reorganization. There are still multiple ERP systems within CIM that were carried over from the prior reorganization while other parts of CIM have implemented Oracle. None of the systems are easy to reconfigure, nor do they allow easy communication between systems, making

it difficult to properly create the four new subdivisions for accounting purposes. It is difficult to take business units out of the existing structures and regroup them. It was noted that it was easier to add groups together as was done during the 2000 reorganization than it was to break them apart which was occurring now. As one person indicated, implementing an ERP is similar to pouring wet concrete on your organizational structure. Initially you can shape it any way you want, but it is much more difficult to reconfigure.

As the time period for the research neared the end, MotorCo was still adjusting to the changes and reorganization of the last few years. The centralization of IS services, was successfully moving forward. The selection of Oracle was viewed as a positive move that would save money and allow smaller divisions to have access to better technology, and therefore, to leverage the size of MotorCo.

For the past two years, inflation (EE-12) has been a serious issue, putting even greater pressure on already tight profit margins. The competitive nature of MC's markets has not allowed them to pass the inflation in raw materials prices on to their customers, causing MC's profit margin to be caught in the middle. Because inflation has impacted everyone in the industry and not just MC, to this point, no strategic or organizational changes have resulted from the inflation. It is, however, an issue that was recognized by all interviewed as of significance to MC and will require some reaction if the inflation continues.

Table 1: Financial Summary

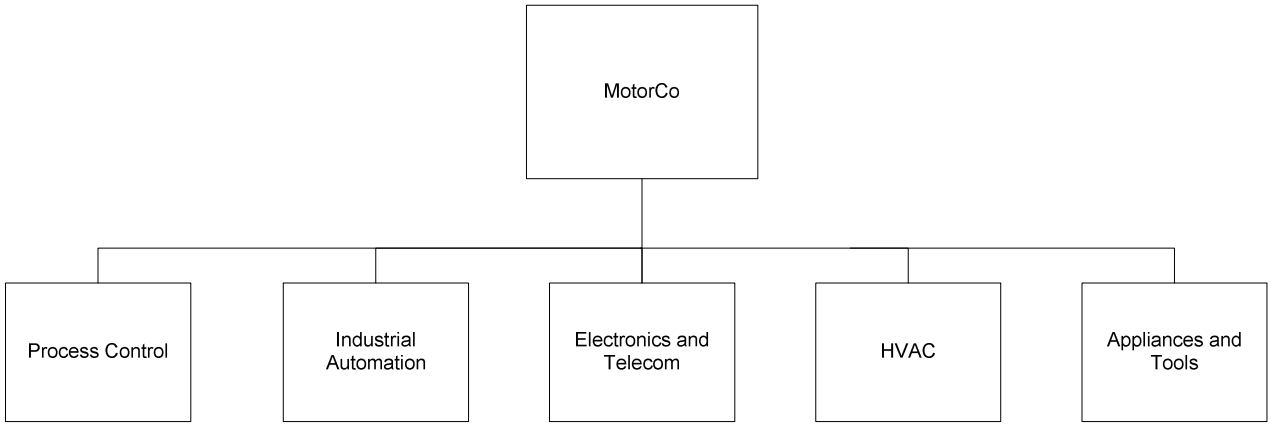


Figure 1: MotorCo Corporate Structure from 1999 to 2004

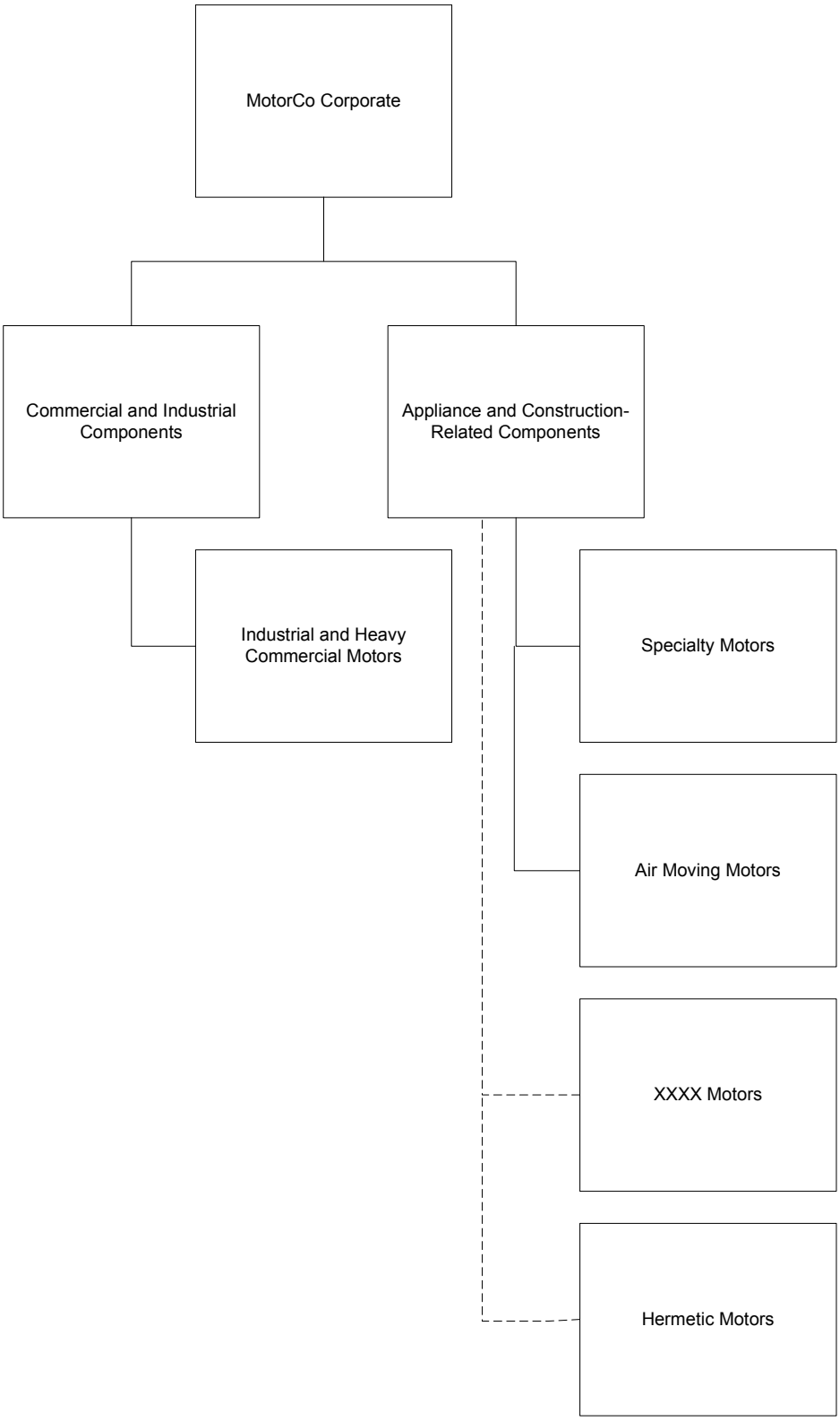


Figure 2: MotorCo Corporate Structure from 1995-1999

Note: Only the Electric Motor subunits are presented on this figure.

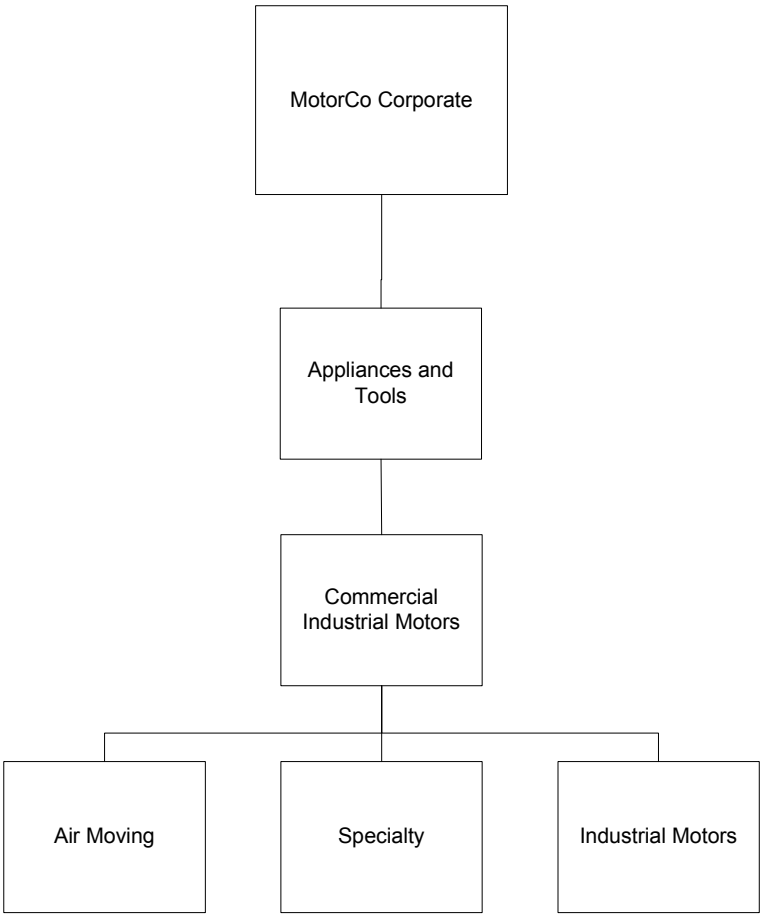


Figure 3: 2000 Reorganization of the Motor Company Division

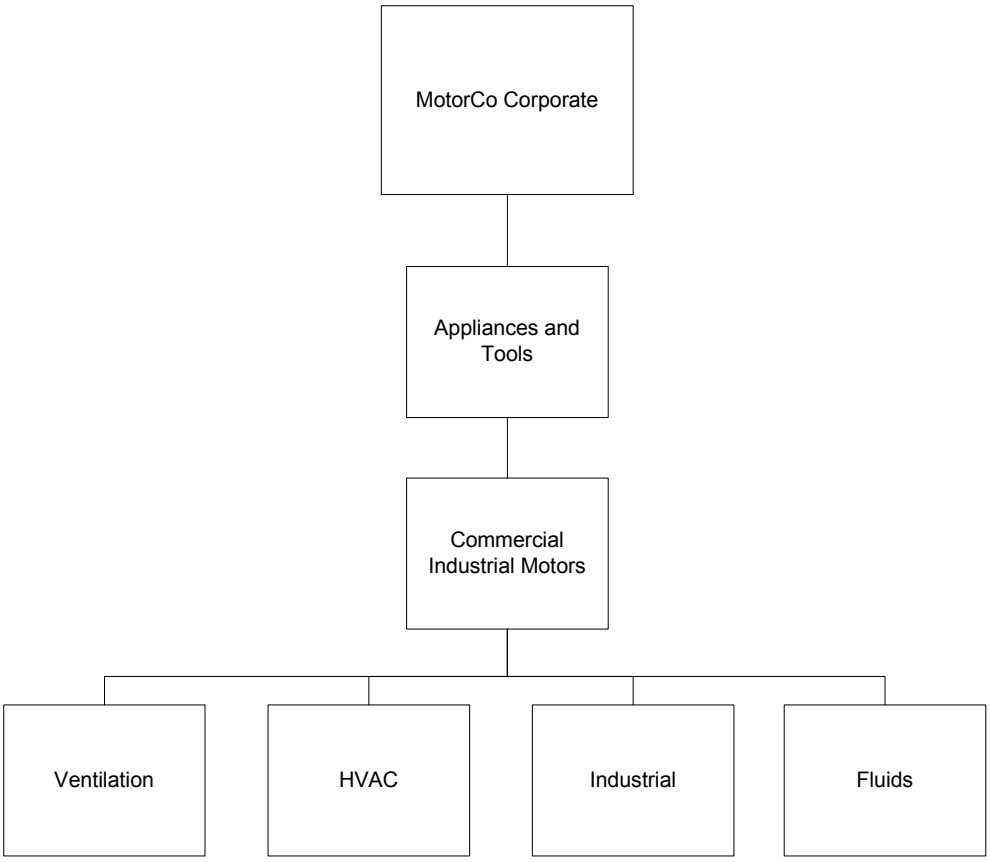


Figure 4: 2003 Reorganization of the Motor Company Division

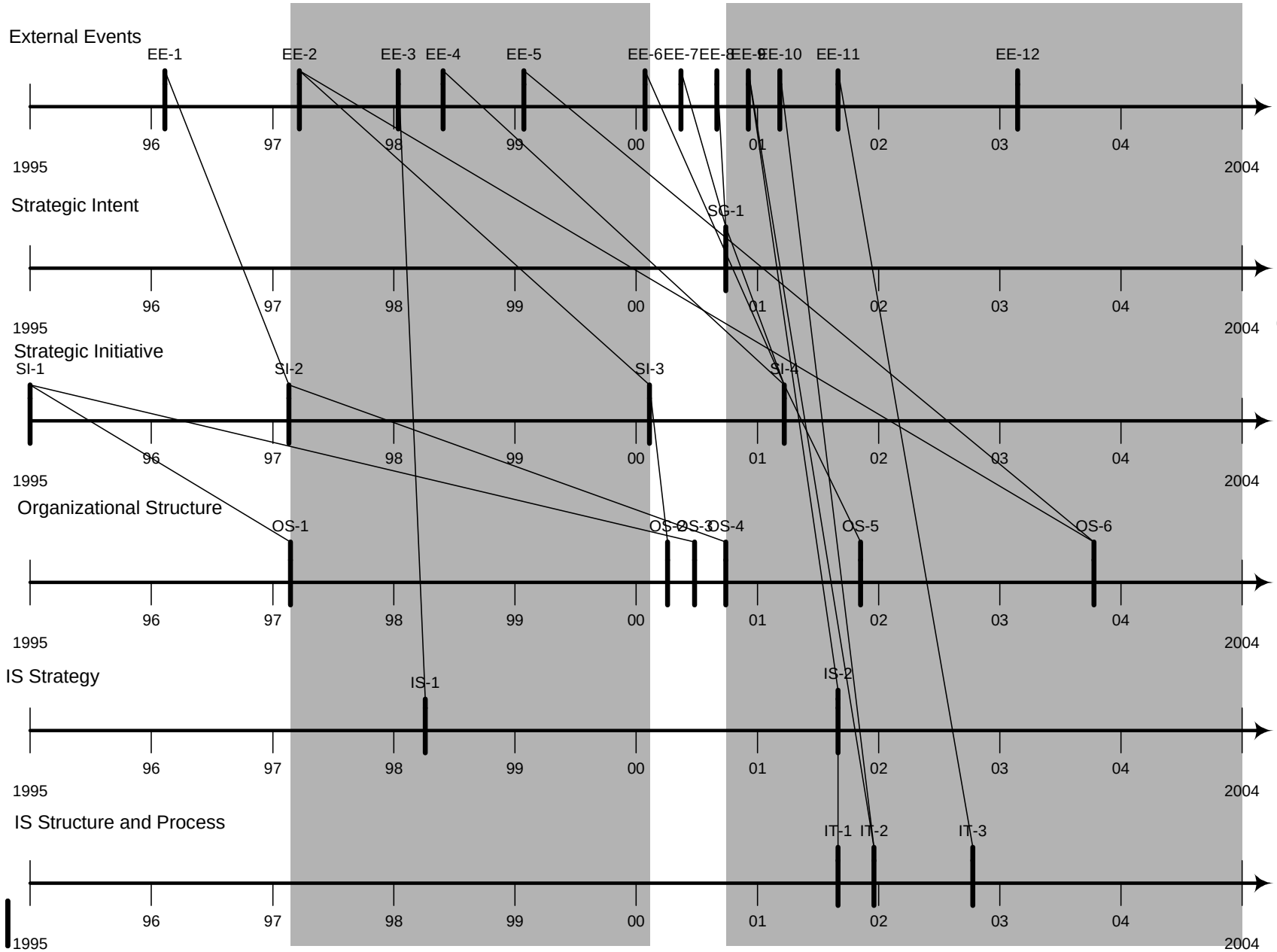


Figure 5: MotorCo Timeline

Appendix D-1: Event Tables

Label	Year[18]	Description
EE-1	1996	Proliferation of the Internet
EE-2	1997	Shift in Corporate Level Strategic Initiatives
EE-3	1998	Concerns over Y2K
EE-4	1998	Stated Strategic Importance of IS and Development of Corporate-wide Procurement System
EE-5	1999	Reorganization of Corporate Business Segments
EE-6	2000	Establishment of Corporate-wide Internet Connectivity Service
EE-7	2000	Crash in Technology Market and Recession in U.S. Economy
EE-8	2000	Increasing Foreign Competition
EE-9	2001	Creation of Corporate-wide IT Shared Services.
EE-10	2001	Adoption of Oracle as Corporate-wide Enterprise Application
EE-11	2002	Legislative Response to Corporate Scandals (Sarbanes Oxley Act)
EE-12	2003	Inflation in Raw Material Prices

Table 3a: Changes in External Environment

Label	Year	Description
SG-1	2000	Shift in Business Unit Level Strategic Goal from Growth to Profitability

Table 3b: Changes in Business Unit Strategic Goals (Intent)

Label	Year	Description
SI-1	1983	Continuing Best Cost Strategy
SI-2	1997	Initiating an eBusiness Strategy
SI-3	2000	Focusing on End Customer
SI-4	2001	Reductions in SG&A Costs

Table 3b: Changes in Business Unit Strategic Initiatives

[18] The dates on the events is an approximation based in the combined interviews and review of publicly available data. In general there was a time lag between a strategic initiative was introduced at the corporate level and the impact or action taken at the division level. For example, the 1997 annual report introduced the concept of end-customer focus, but it was 1999 at the earliest before interviewees at the divisional level mentioned the strategy.

Label	Year	Description
OS-1	1997	Shifting Manufacturing Plants to Mexico
OS-2	2000	Creation of Commercial Industrial Motors Division
OS-3	2000	Off-Shoring of Manufacturing
OS-4	2000	Establishment of eBusiness Group
OS-5	2001	Outsourcing of SG&A Tasks
OS-6	2003	Reorganized CIM into Four Business Units

Table 3c: Changes in Organizational Structure and Process

Label	Year	Description
IS-1	1998	Focus on Y2K Compliance
IS-2	2001	Centralization/Leveraging Corporate-wide IS Resources

Table 3d: Changes in IS Strategy

Label	Year	Description
IT-1	2001	Formation of IT Shared Services
IT-2	2001	Initial Implementation of Oracle as Motor Company's Standard Enterprise Application
IT-3	2002	Increased IS Security and Compliance with Sarbanes Oxley Act

Table 3e: Changes in IS Structure and Processes

Appendix D-2: Episodes in IS Adaptation

"Alignment Factor"	Episode 1 – Initiating an eBusiness Strategy		
	Date Initiated	**Description**	**Trigger**
External Environment	1996	Proliferation of the Internet (EE-1)	Technological Innovation
	1998	Concerns over Y2K (EE-3)	
Strategic Intent (Goals)		No Change	
Strategic Initiatives	1997	Initiating an eBusiness Strategy (SI-2)	Proliferation of the Internet (EE-1)
Organization Structure	1997	Shifting Manufacturing Plants to Mexico (OS-1)	Continuing Best Cost Strategy (SI-1)
IS Strategy	1998	Focus on Y2K compliance (IS-1)	Concerns over Y2K(EE-3)
IS Structure		No Change	

"Alignment Factor"	Episode 2 – Focus on End Customers		
	Date Initiated	**Description**	**Trigger**
External Environment	1997	Shift in Corporate Level Strategic Initiatives (EE-2)	Slowing Growth and Customer Feedback
	1998	Stated Strategic Importance of IS and Development of Corporate-Wide Procurement System (EE-4)	
	1999	Reorganization of Corporate Business Segments (EE-5)	
	2000	Establishment of Corporate-wide Shared Internet Connectivity (EE-6)	
Strategic Intent (Goals)		No Change	
Strategic Initiatives	2000	Focusing on End Customer (SI-3)	Shift in Corporate Level Initiatives (EE-2)
Organization Structure	2000	Creation of the Commercial Industrial Motors Division (CIM) (OS-2)	Shift in Corporate Level Initiatives and Focus on End Customer (EE-2 and SI-3)
	2000	Off-Shoring of Manufacturing (OS-3)	Continuing Best Cost Strategy (SI-1)
	2000	Establishment of eBusiness Group (OS-4)	Initiating an eBusiness Strategy (SI-2)
IS Strategy		No Change	
IS Structure		No Change	

"Alignment Factor"	Episode 3 – Focus on Cutting SG&A Costs		
	Date Initiated	**Description**	**Trigger**
External Environment	2000	Crash in Technology Market and Recession in U.S. Economy (EE-7)	
	2000	Increasing Foreign Competition (EE-8)	
	2001	Creation of Corporate-wide IT Shared Services (EE-9)	
	2001	Adoption of Oracle as Corporate-wide Enterprise Application (EE-10)	
	2002	Legislative Response to Business Scandals (Sarbanes Oxley Act) (EE-11)	
	2002	Inflation in Raw Material Prices (EE-12)	
Strategic Intent (Goals)	2000	Shift in Business Unit Level Strategic Goal from Growth to Profitability (SG-1)	Crash in Technology Market and Recession in U.S. Economy (EE-7) and Increasing Foreign Competition (EE-8)
Strategic Initiatives	2001	Reductions in SG&A (SI-4)	Shift in Business Unit Level Strategic Goal from Growth to Profitability (SG-1)
Organization Structure	2001	Outsourcing of SG&A Tasks (OS-5)	Shift in Business Unit Level Strategic Goal from Growth to Profitability. Reduction in SG&A (SG-1 and SI-4)
	2003	Reorganization of CIM into Four Business Units (OS-6)	Consistent with Corporate Level Initiatives (EE-2 and EE-5)
IS Strategy	2001	Centralization/Leveraging Corporate-wide IS resources (IS-2)	Stated Strategic Importance of IS and Development of Corporate-Wide Procurement System (EE-4) and Creation of Corporate-wide IT Shared Services (EE-9)
IS Structure	2001	Formation of IT Shared Services (IT-1)	Creation of Corporate-wide IT Shared Services (EE-9) and Centralization/ Leveraging Corporate-wide IS resources (IS-2)
	2001	Initial Implementation of Oracle as Motor Company's Standard Enterprise Application (IT-2)	Move to Corporate-Wide IT Shared Services and Selection of Oracle (EE-9 and EE-10)
	2002	Increased IT Security and Compliance with Sarbanes Oxley Act (IT-3)	Business Scandals and Sarbanes Oxley Act (EE-11)

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